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The INDUSTRIAL-ARTS MAGAZINE

FEBRUARY~1926

The BRUCE PUBLISHING COMPANY
MILWAUKEE, WISCONSIN

ATKINS

SILVER STEEL **SAWS** SAW TOOLS AND SAW SPECIALTIES

No. 400. Ship Point

No. 53. Regular

No. 51. Ship Point

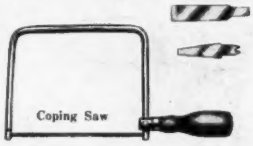
No. 65. Regular

No. 100. Flooring Saw

Plumbers' Saw

Compass Saw

Handy Tools


Coping Saw

AAA Grass Hook

Lever Saw Set

Bit Brace

Modern Methods Make Atkins Saws the Leaders

Atkins Saws stand at the head of the list of high grade tools, not only for quality of materials but for real improvements and patented features possessed by no other make.

Sawing Made Easy

The patented grinding feature of Atkins Silver Steel Saws provides for the cutting edge to be the same thickness throughout, while the back tapers gradually wedge-shape from handle to point. This feature makes sawing easy under all conditions, and at the same time it speeds up production and saves a world of hard work.

Improved Perfection Handle

This patented handle is furnished on Atkins Nos. 53, 65 and 400. Its distinctive features are a big improvement over the old style block handle.

Informative literature will be sent you on request. Enclose 35c for a high grade nail apron; ask for Saw Sense and souvenir.

No. 7. Pruning Saw

No. 11. Pruning Saw

No. 82.

Junior Mechanic

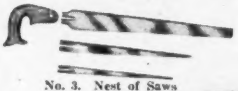
No. 21. Metal Cutting

No. 61. Regular

Carpenters' Handy Saw

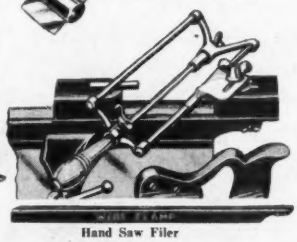
Cable Saw

Back Saw


No. 3. Nest of Saws

No. 3. Trowel

Perfection Floor Scraper


Hand Saw Filer

E. C. ATKINS & COMPANY

ESTABLISHED 1857 THE SILVER STEEL SAW PEOPLE

Machine Knife Factory: Lancaster, N. Y.

Home Office and Factory: Indianapolis, Ind.

Canadian Factory: Hamilton, Ont.

BRANCH HOUSES

Atlanta, Memphis, Chicago, Minneapolis, New Orleans, New York, San Francisco, Portland, Vancouver, Paris, France

THE FINEST ON EARTH

The Proper Finish for Projects of Wood

THE finishing of projects of wood is most important and should receive its full share of attention. Every Instructor of woodworking realizes that a beautifully constructed model may be ruined if improperly finished, whereas the defects of poor construction are minimized if the model is well finished.

For years we have kept our fingers on the pulse of progress of Industrial Arts and Vocational Education. We have striven to meet their Wood Finishing needs. That we have been successful is demonstrated by the fact that Johnson's Artistic Wood Finishes are used in nine-tenths of the schools in the United States and Canada. The endorsement of the world's foremost Instructors of Industrial Arts and Vocational Education is a convincing tribute to the merit of our products.

Our line of Artistic Wood Finishes is complete—it includes *Johnson's Wood Dye, Paste Wood Filler, Under-Lac, Polishing Wax, Varnishes, Enamels,* and *Undercoats.* They are all easy to apply—the youngest and most inexperienced pupils can use them with splendid results.

JOHNSON'S WOOD DYE

With Johnson's Wood Dye inexpensive soft woods may be finished so they are as beautiful and artistic as hardwood. All shades may be easily lightened or darkened. Directions on every label.

17 Beautiful Shades for STAINING WOOD

Johnson's Wood Dye penetrates deeply, bringing out the high lights of the wood without raising the grain. It is simple to apply—goes on easily and quickly without a lap or a streak.

FREE—*this valuable book*

Our new "Text Book on Wood Finishing for Instructors and Students of Industrial Arts and Vocational Education" is just off the press. Wouldn't you like a copy for each boy studying woodworking? We will gladly send the required number Free and Postpaid to Instructors who are using or will use Johnson's Artistic Wood Finishes in their woodworking shop. Use coupon at right.

We have a complete set of Wood Finishing Job Sheets (eight in all) which show job specification—job application—material—tools and equipment—procedure, etc. We will gladly send these Job Sheets postpaid and free of all charge to Instructors of Wood Finishing.

S. C. JOHNSON & SON, Dept. I. A 2. RACINE, WIS.
"The Wood Finishing Authorities"

We have ..... boys studying woodworking and would appreciate receiving the following material:

☐ *Wood Finishing Job Sheets*
☐ *Text Books on Wood Finishing*

We buy most of our Wood Finishes from.....

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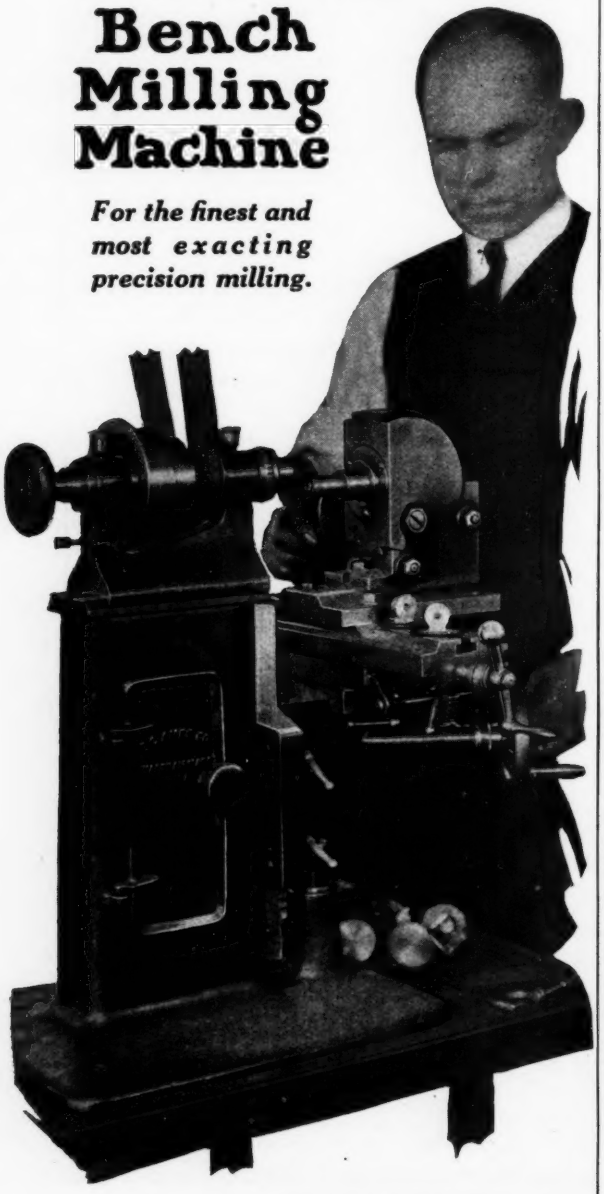
AMES

Bench Milling Machine

For the finest and most exacting precision milling.



Send for Catalog

B.C.AMES CO.
Waltham,Mass.

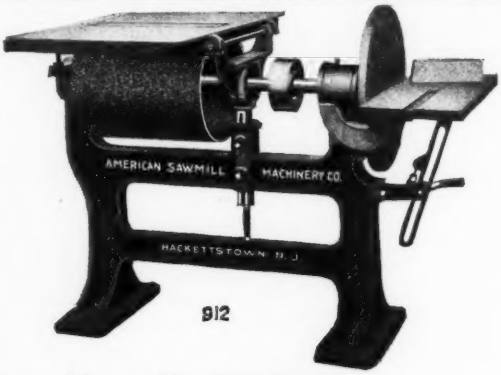
B. C. AMES CO.,
Waltham, Mass.

Please send me complete information about AMES BENCH MILLERS.

Name .....

Address .....

I.A.2 .....



For fine finishing — this SANDER

Here is a combined drum and disc Sander, specially designed for sanding flat or bent work on the drum and for general disc sanding.

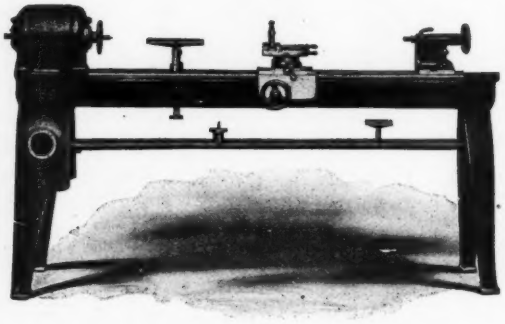
This is not a machine made for manual training only, or to sell at a price. It is a practical machine for practical shop work. Like the "American" Saw Bench, Lathe, Woodworkers and Band Saw, this Sander gains the respect of students for good tools and good work.

AMERICAN
SAW MILL MACHINERY CO.

MAKERS OF WOODWORKING AND SAW MILL MACHINERY

74 MAIN ST., HACKETTSTOWN, N. J.

Motor Headstock Lathes



Our Motor Headstock Lathes are the last word in manual training school equipment. They can be equipped with either A.C. or D.C. motors. Various speeds are controlled by a speed regulating dial convenient to the operator. Complete installations of all woodworking equipment in the manual training departments of the largest and most modern high schools in St. Louis, the Theodore Roosevelt and the Beaumont, were made by this Company.

We manufacture a complete line of manual training equipment.

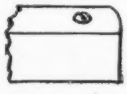
Hall & Brown Wood Working Machine Co.

Broadway, Tyler, Ninth Sts.,
ST. LOUIS, MO.

See for yourself the advantages of this gauge

This heavy spur of tempered steel cuts a clean groove in the wood instead of following the grain. It is ground to a special shape especially for school work. Stays sharp indefinitely. You can adjust gauge to mark within 1/16" of the edge.

Oval head permits working in close quarters. Inlaid brass strips protect head. Special knurled screw-head gives a positive lock and is designed to prevent over-tightening or splitting of the head.



Stop in stem prevents removal and loss of head. A little feature but it means a lot in the school shop.

Especially in the school shop are these features desirable

GLANCE at the pictures shown at the left. Read the text telling the advantages of the Disston No. 83 Marking Gauge.

Aren't those the features you want in a gauge... for accurate, convenient work... for developing correct practice... for a fool-proof, useful tool that will last a long time?

It means a lot to a boy when that heavy spur of tempered steel cuts a clean, straight groove—instead of following the grain;

When he can get a firm, comfortable grip because of the oval head and the size of the bar;

When he can get in close corners with the special oval-shaped head;

Or when he can set his gauge without fear that it will slip.

Then that stop in the stem helps you. It will not permit removal and loss of the head or gib.

And the special screw-head prevents over-tightening or splitting.

Yet the Disston No. 83 Gauge, with all these advantages, costs you no more.

There's a coupon below that will bring you a folder picturing and describing other Disston Tools, with special features for schools. Send it in today.

HENRY DISSTON & SONS, INC.
Makers of "The Saw Most Carpenters Use"
PHILADELPHIA, PA.

Disston No. 83 Marking Gauge

Made of cherry wood inlaid with two brass strips to give additional strength. Finely finished. Not graduated so that pupils will develop the practice of setting with a rule. Can be graduated if specified.

Standard School Equipment for Joinery, Turning, and Pattern-making Shops

D-8 Cross-Cut Hand Saws, 9 point, in 22, 24 and 26 in. lengths
D-8 Rip Hand Saws, 7 point, in 22, 24 in., and 6 point in 26 in. lengths
No. 4 Back Saws, in 8, 10, or 12 in. lengths
No. 95 Keyhole Saws
No. 10 Coping Saws and Blades
No. 4 Mitre-Box Saws, 20, 22, 24 or 26 in. lengths
No. 70 Dovetail Saws
No. 36½ Hack Saws
No. 200 Hack Saws
Web Saws Complete
No. 83 Marking Gauge
No. 5½ Try Square
No. 3 Bevel
No. 10 Mitre Square
Cabinet Scrapers
Cabinet Burnishers
No. 9 Screw Drivers
Cabinet-Makers' Screw Drivers
Wood Rasps
Taper Files
Auger Bit Files
No. 28 Triumph Saw Sets
Hand Saw Jointer, Complete
D-3 Hand Saw Filing Guide and Clamp
Disston Narrow Band Saws and Filing and Setting Machines
Novelty Combination Circular Saws
Keystone Groover or Dado Head
Files
Filing Card and Brush
Saw Pieces for Practice Filing
Machine Knives

Dept. L · Henry Disston & Sons, Inc.
Philadelphia, U. S. A.

Please send me, free, the folder picturing and describing Disston Tools for Schools.

Name _____

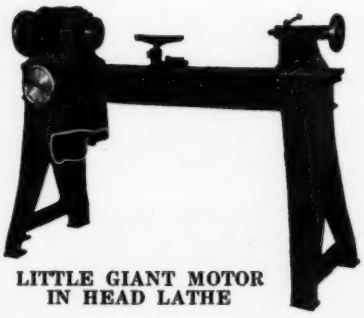
School _____

City _____ *State* _____

DISSTON

Little Giant Lathes and Band Saws

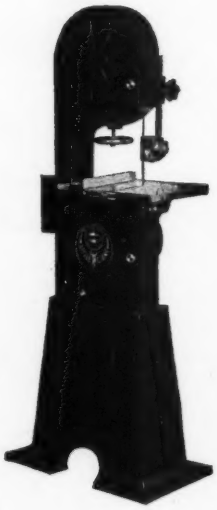
Sold on 30 Days Free Trial



LITTLE GIANT MOTOR IN HEAD LATHE

A new, handsome catalog is now ready and will be mailed free.

We employ no traveling salesman. We depend on the goods themselves to show their merits. So we sell Little Giant Lathes and Band Saws on condition that if not satisfactory they may be returned after 30 days use and we pay the freight both ways.



Write us for catalog

LITTLE GIANT COMPANY

223 Rock Street **Mankato, Minnesota**

The Silver

Portable Electric Saw

For Rip-Sawing, Mitreing and Cross Cutting
Attaches to nearest Light Socket
A Compact, Powerful and Inexpensive Saw for the Manual Training Department

No. 895
A Silver Quality Product

Send for complete description and prices

THE SILVER MFG. CO., Box 397, Salem, O.

Manufacturers of Quality Goods Since 1854.

THE JOHNSON FRICTION CLUTCH

Schools in 18 States

Use Johnson Clutches.

The high-quality Johnson Friction Clutches are used extensively in manual training departments of schools in EIGHTEEN states. The Johnsons start the machines quickly, stop them instantly, or brake them gradually, as desired.

On the line-shafts the Johnsons pay for themselves over and over by their large savings in power, pulleys, countershafts, over-head belting and other necessary equipment.

We specialize in Johnson Clutches to meet any conditions. Our lineshaft drives solve countless transmission problems. Strong, compact, long-life clutches which embody amazing power.

Pulley Mounted, Single Clutch.

Manual training directors and school board members are invited to write us for full data on our Clutches. Blue prints and engineers' expert findings gratis. Equip with Johnson Clutches.

Write for Catalog "I.A.M."

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER, CONN.

If you take pride in doing good work rapidly

you will like this "Oliver" No. 61 Electric Surfacer

Let your Students form the Production Habit. Give them the type of machine to work with which will make every ounce of effort count.

It's almost an impossible job to crowd the feed on the "Oliver" No. 61 Single Surfacer. There are four feed rolls, power driven. Sectional in-feed roll and sectional chipbreaker adds to the safety and quality of output.

Although "Oliver" Surfacers are production machines, over 200 Schools are using them. Write for details.

Oliver Machinery Company

Works and General Offices

GRAND RAPIDS, MICH.

SIMO

A Circular Saw that cuts smooth and fast

Best Saw for School Shops

THE NEW PLANER SAW

For fast hand feed cutting this saw gives results practically as smooth as a Planer Knife, Cross-cuts or Rip, any kind of wood. Just the Circular Saw to do all the work in any school wood-working shop. Looks like the old time Novelty Saw but it's different. Made 6 to 24 inches in diameter. Be sure your order specifies SIMONDS PLANER SAW.

NDS SAWS

Blue Ribbon Hand

For better work in the manual training or vocational school get Simonds Blue Ribbon Hand Saws. These are high grade saws that hold their edge longer and cut smooth. They are made of the finest saw steel, produced in Simonds own steel mills. Expert saw men of years experience make Simonds Blue Ribbon Saws perfect for better school work.

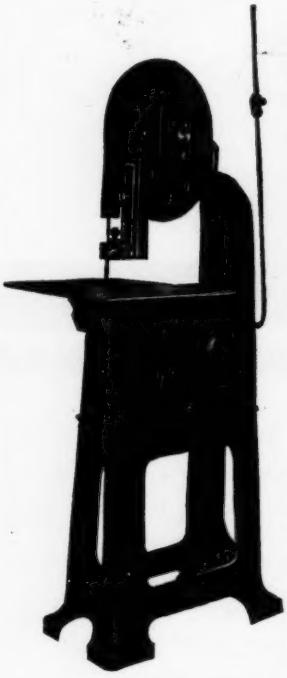
Simonds Saw and Steel Co.

Established 1832 ~ Fitchburg, Mass.

Wallace
PORTABLE MACHINES

Wallace 16" Band Saw
Wallace Universal Saw
Wallace Plain Saw
Wallace 6" Jointer
Wallace 4" Planer
Wallace 6" Lathe
Wonder Spindle Sander
Wonder Disc Sander
Wallace Electric Glue Pot
—Automatic Heat Control

Wallace Machines have been selected by hundreds of schools in preference to all others. They have proven themselves to be ideally adopted for school work. Built for absolute accuracy, easy to operate and can handle all manual training work.



Like all Wallace Machines the 16" Portable Band Saw is simple in operation and absolutely accurate. Each is fitted with special approved safety guards. Has built-in direct connected motors — no belts to slip and dissipate power—simply plug into any light or power socket.

You can install complete equipment for little more than the cost of one large machine of similar high grade construction.

Write for catalog 402 C and names of Wallace equipped schools.

Solar-Wallace Job Sheets

Of special interest to all instructors and students of manual training. An unusual series of plans and specifications for use in woodworking classes.

If you wish we will put you on the list for new sheets that are issued regularly.

J. D. WALLACE & CO.

140 So. California Ave.
Chicago, Illinois

Sound Economy in Equipping the Wood Shop!

Model E-2 Without Band-Saw and Mortising Boring device Model E

In any manual training school whether large or small the installation of Tannewitz Wood Workers is mighty sound economy. For with one of these machines the bulk of wood-working operations can be taught thoroughly and conveniently — thus eliminating much expensive equipment.

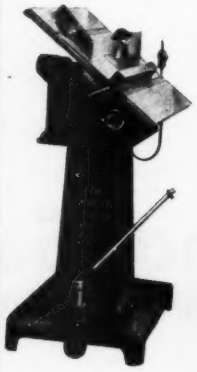
It will rip, cross-cut — mitre — bevel — groove — joint — dado — rabbet — plane — band saw — mould — mortise and bore.

Ball Bearings equipped with Gits oilers used throughout. 2 H.P. Motor—three operators can work at it simultaneously—unhampered—safely. Attachments put in motion without shifting belts. Completely guarded. A man's size thoroughly practical machine for the economical equipment of manual training schools—Let us show you—Write for bulletin E-2.

THE TANNEWITZ WORKS

303 Front Ave. GRAND RAPIDS, MICH.

Modern Schools Choose Union Woodworking Machines



Union Woodworkers require no installation expense. They are compact and portable, accurate and finely made. Both first and upkeep costs are low, enabling you to provide a sufficient number to care for every student. Let us send you the complete catalog. Write today.

Gallmeyer & Livingston Co.
214 Straight Ave.
GRAND RAPIDS, MICH.

UNION PORTABLE AND BENCH TYPE WOOD WORKING MACHINES

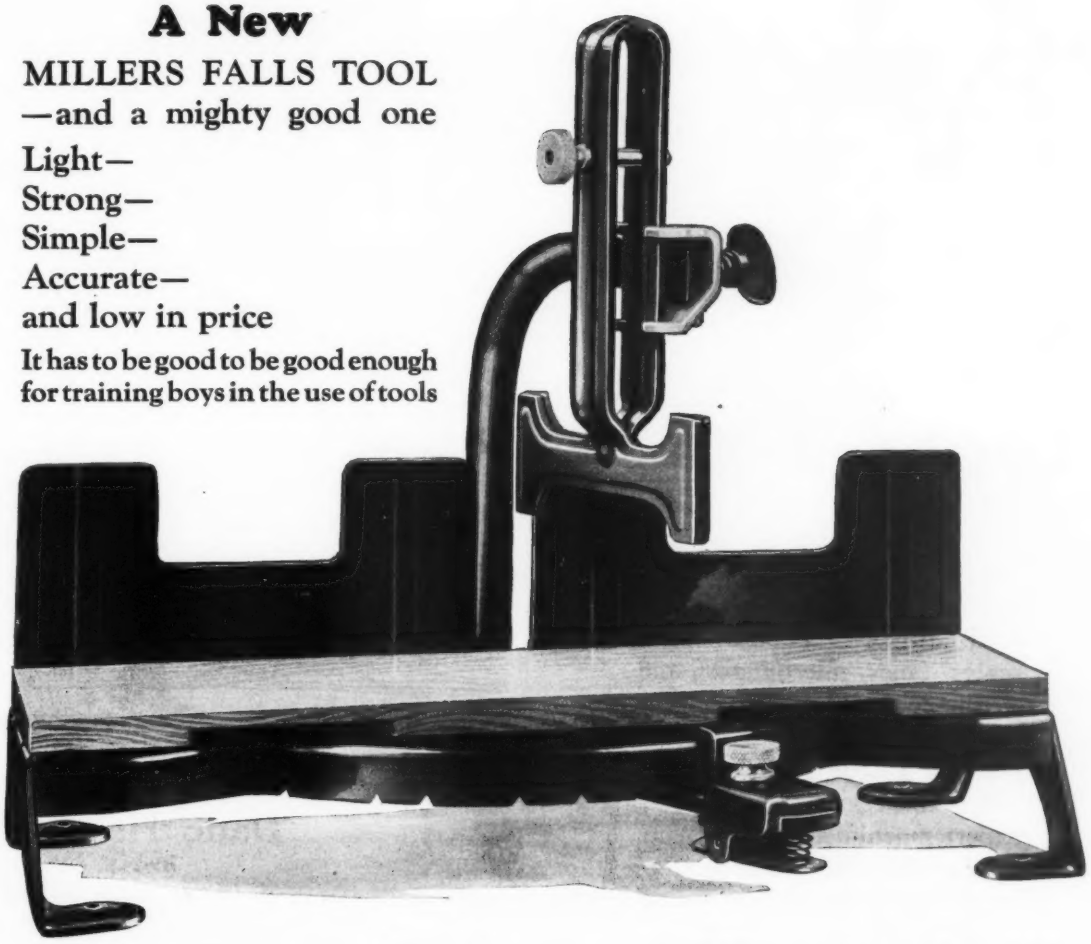
Mitre Box No. 110

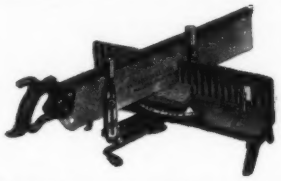
A New

MILLERS FALLS TOOL
—and a mighty good one

Light—
Strong—
Simple—
Accurate—
and low in price

It has to be good to be good enough for training boys in the use of tools





Langdon Acme Nos. 68-75

THE finest in the Millers Falls line—a mitre box of the highest type. Recognized as standard by carpenters and wood workers. A famous precision tool—made for hard work, for exact work.

Here's our new Mitre Box No. 110

WE'VE made it for those who want a good practical mitre box and don't want to spend much money for it. Made for the "handy man about the house"—and just right for manual training work. It is simple, accurate, light-weight, strong (all steel); takes either back or panel saw. And all at a price that deserves to be called "popular".

It is a mighty good mitre box—made by the makers of the famous Langdon Acme (shown at the left), standard throughout the world. Fifty years' experience go into the making of Millers Falls Mitre Boxes—and the Millers Falls trademark always means good tools.

Write for new Mitre Box folder, showing all types

MILLERS FALLS TOOLS
SINCE 1868

'S a fact!

Legibility—easy reading graduations — promotes accuracy. And Starrett Tools — steel scales, tapes, micrometers and all the 2000 odd precision tools that bear the Starrett name—*are* just a little easier to read. That's one reason why so many expert machinists prefer them. Apprentices and students, too, appreciate their easy-reading qualities.

Send for Catalog and Supplement No. 23 "CE."

THE L. S. STARRETT CO.

World's Greatest Toolmakers
Manufacturers of Hacksaws Unexcelled
Steel Tapes - Standard for Accuracy

ATHOL, MASS.

Starrett Tools

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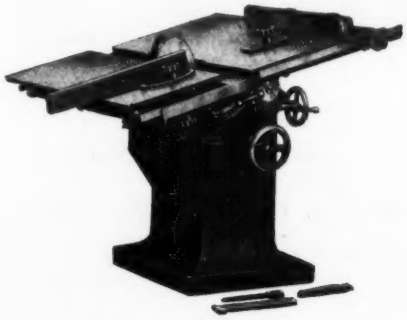


The No. 10 Crescent Saw Table is a sturdy, substantial machine with every convenient adjustment for general factory work and will meet every requirement for a practical saw table with self-contained motor for your manual training department.

Send today for circular giving complete description. Also ask for circular of band saws, saw tables, shapers, jointers, variety wood worker, planers and matchers, disk grinders, cut off table, swing saws, borers, hollow chisel mortiser, tenoner, universal wood workers, self feed rip saw.

THE CRESCENT MACHINE CO.

25 Main St.,

LEETONIA, OHIO.

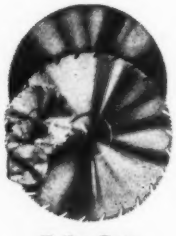
Huther Bros. Dado Head

You need a Huther Dado Head

The saw that makes intricate cutting and grooving simple. This saw, developed from our own patents, consists of two outside cutters and a sufficient quantity of inside ones to perform the required cut. The outside cutters can be used singly or in pairs as required.

Every builder or contractor, wishing lock corners or any sort of grooving, will find his production costs lowered by this saw.

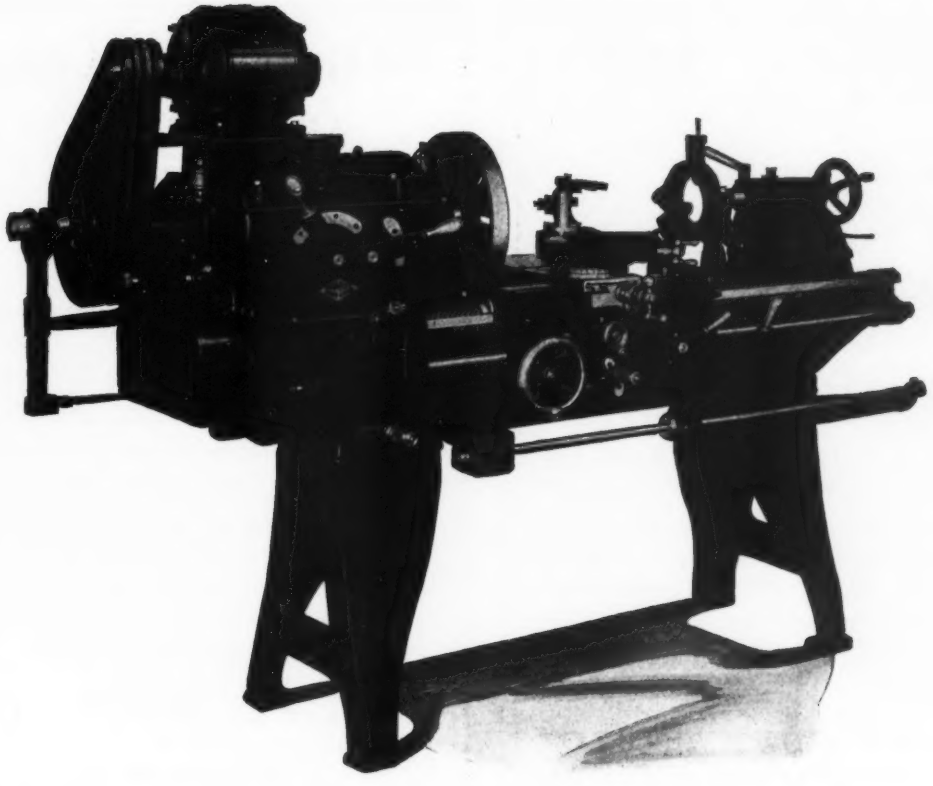
Write for complete information and prices, or send for one on approval. It may be returned at our expense if unsatisfactory.



Huther Bros. Hollow Ground Saw

HUTHER BROS. SAW MANUFACTURING COMPANY
Rochester, N. Y.

Makers of Better Saws for More Than 50 Years.



Geared-Head Versus Cone-Head Lathes

SIDNEY

14″ x 6′

All-Geared Head Lathe

Equipped with wide, deep-mesh, machine cut, all-steel gears, full quick change gear box, 2 face plates, steady rest, follow rest and compound rest with micrometer adjustment, apron control and suitable motor mounted for belt or silent chain drive for the low net price of..... $740

Modern factories and production shops prefer the all-geared head lathe because of their greater efficiency, speed and economy. Cone-head lathes have proven too costly—too slow. Geared-head lathes also provide easier control, better and speedier workmanship and no power loss.

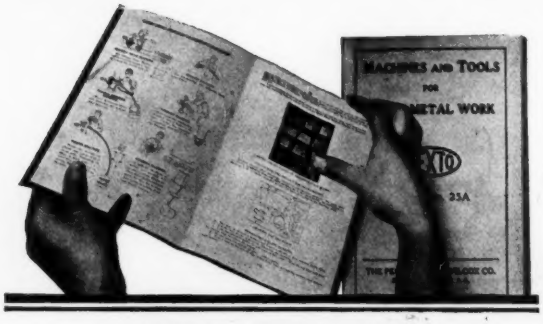
That's why school lathe equipment should be of the geared-head type. Schools should not only teach the modern youth upon the same equipment found in the modern shop but should also select all-geared head lathes for their greater economy and efficiency.

The 14″ x 6′ all-geared head, 8-speed lathe shown above is a good example of the moderate price of Sidney Lathes of this style. It embodies every requirement for school use yet costs no more than a cone-head lathe of the same dimensions. Completely guarded and protected by safety devices, these lathes are finding high favor among school buyers everywhere.

Send for illustrated catalog and full information on the complete line of Sidney Lathes. Address Dept. 402.

The Sidney Machine Tool Company
Sidney, Ohio

SIDNEY SERVICE



PEXTO GUIDE No. 25A

Free for the Asking—

SHEET METAL WORK—as an Industry—its Value as a timely Industrial Vocation for School Shops — the Projects — Aims of the Course — Sheet Metal Working Machinery — Application, and other things you would like to know are fully covered.

THE PECK, STOW & WILCOX CO.
Southington, Conn., U. S. A.

When You Think of Supplies

For Your Sheet Metal Working Course

THINK OF

BERGER BROS. CO.

You don't have to shop around when you buy of us. We carry everything from a rivet to the largest machine used for this work.

Ask Any Sheet Metal Worker

If you are not equipped to teach this course you should investigate. The sheet metal industries need skilled labor and need it bad. The work is healthful, the hours short, and the wages high. Let us send you literature on the subject.

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PECK, STOW & WILCOX CO.'S
Line of Tools and Machines

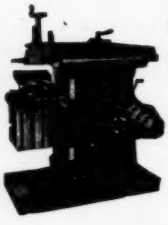
BERGER BROS. CO.

229-231-233-235-237 Arch St.
PHILADELPHIA

1845 — EIGHTY YEARS — 1925
Manufacturing Machine Tools

Thousands in use in shops all over the world giving daily satisfaction.

Meet the requirements of school shops because they are devoid of intricate parts and practically fool proof.



Send for catalogue describing the entire line of SHAPERS, MILLING MACHINES, LATHES and PORTABLE ELECTRIC SCREW DRIVER.

Industrial Education Dept.
THE JOHN STEPTOE CO.
CINCINNATI, OHIO

"OHIO" PLANERS
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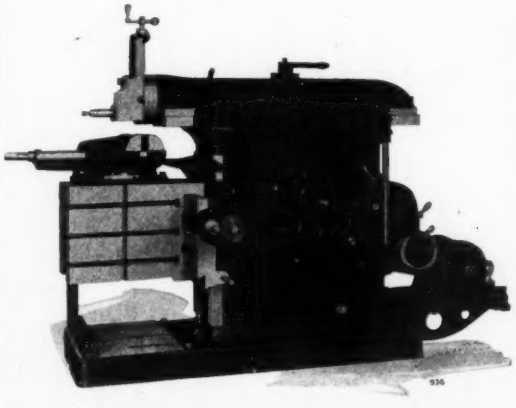

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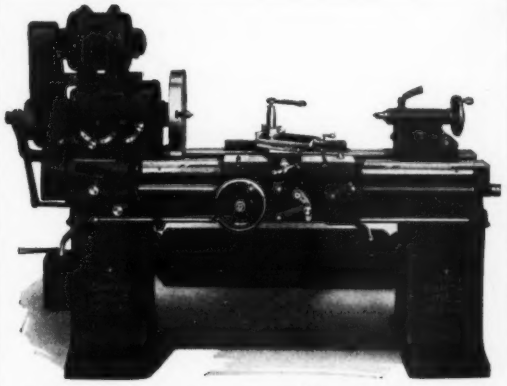

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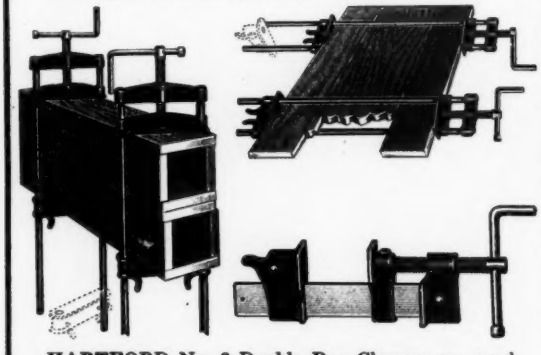

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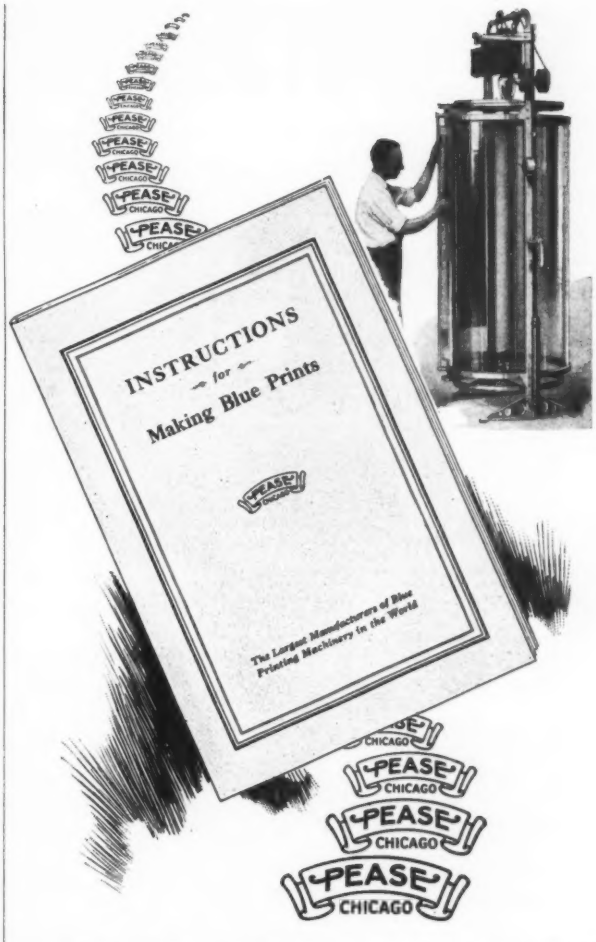

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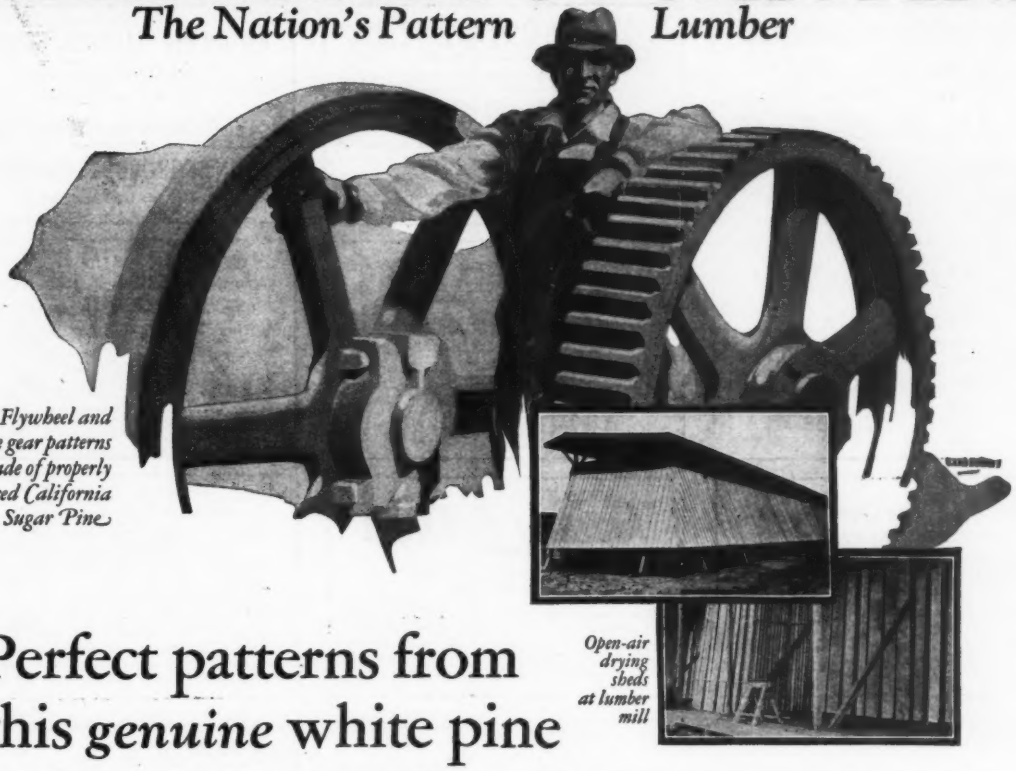

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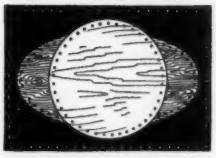

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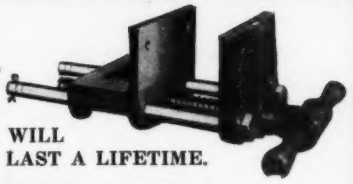

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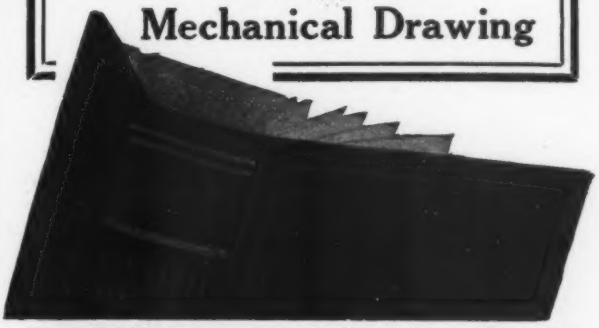

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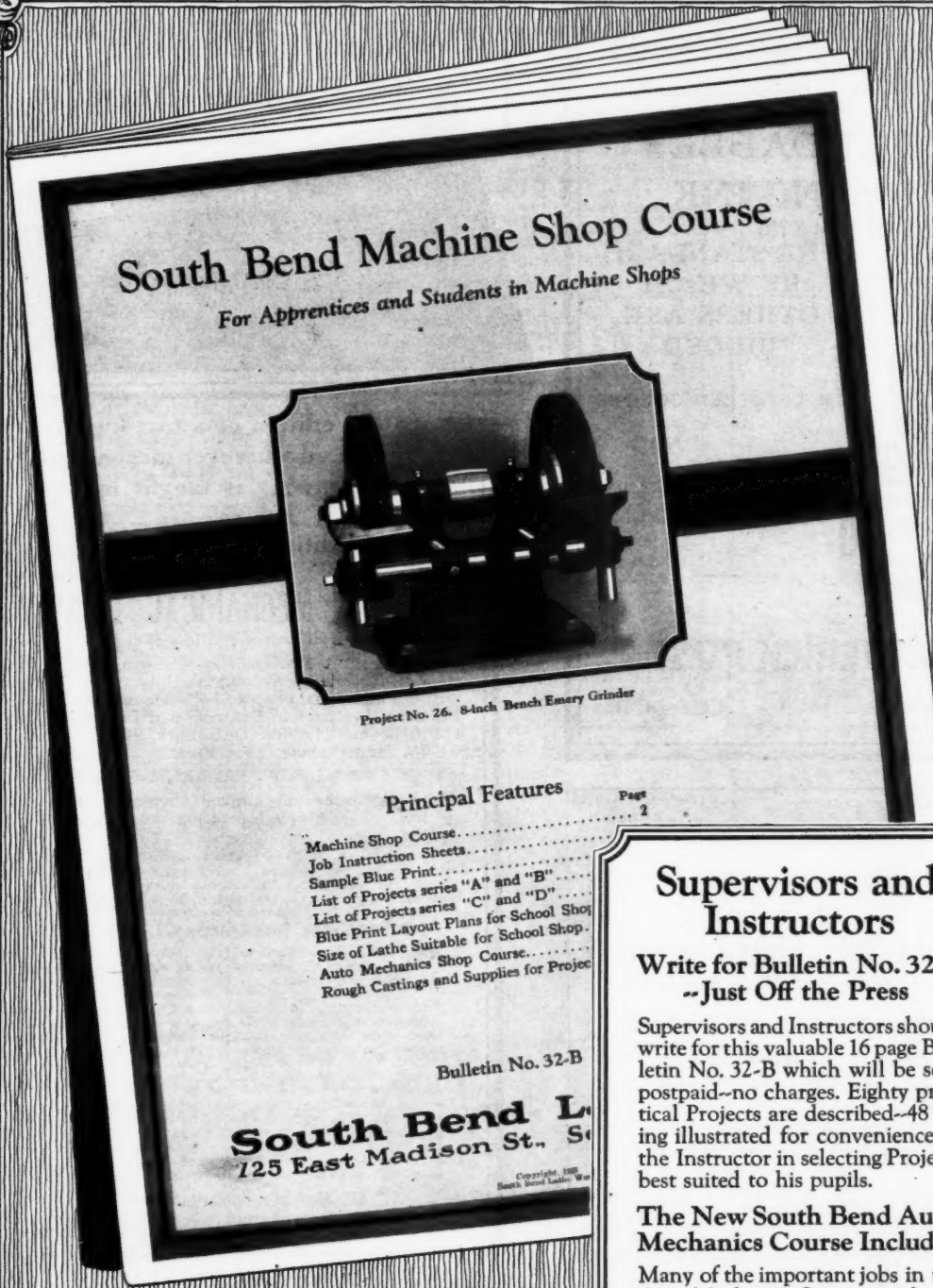
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Vol. XV
No. 2

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A Prize Contest in Shop Projects

The INDUSTRIAL-ARTS MAGAZINE is interested to receive and publish a number of projects which (a) illustrate scientific principles of educational value, and which (b) can be utilized in the science classes in elementary and high schools. To stimulate interest, prizes for the best projects will be awarded as follows:

1. The projects should illustrate some useful scientific or mechanical principles, or be of use in demonstrating such principles in the school laboratory, or lecture room. They should be well within the ability of seventh, eighth, and ninth grade pupils to construct in the woodworking, electrical, sheet metal, or other shop.

2. The drawings or tracings should be inked in and should not exceed 10″ x 15″ in size. Blue prints cannot be considered.

3. A description of the project, not exceeding 600 words in length, with the name and complete address of the author, should accompany the drawing.

4. Drawings must reach the office of the INDUSTRIAL-ARTS MAGAZINE not later than April 1, 1926. Originals will be returned only if accompanied with stamps and a definite request for return.

5. A jury consisting of an Editor of the INDUSTRIAL-ARTS MAGAZINE and a competent instructor will pass on the projects so that the announcement of the winners can be made in the May issue of the MAGAZINE.

6. For the best problem submitted a prize of $15.00 will be paid, and for each of the three projects next in merit a check for $5.00 will be sent. Projects acceptable for publication will be paid for at space rates.

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THE INDUSTRIAL ARTS MAGAZINE

Volume XV FEBRUARY, 1926 No. 2

Individualized Instruction Adapted to Trade and Industrial Schools for Boys

M. M. Walter, Director of Industrial Education, Bethlehem, Pa.

AS a result of several years' experience supervising industrial education in industry, the writer observed that young workers preferred instruction in practical problems outside of the classroom, while mature men were eager to return to school. The youngsters apparently had not forgotten the drudgery of the school, while the older men overlooked it in their desire to gain additional information. Therefore, it was not surprising upon returning to public school work to find that many of the boys enrolled in industrial courses, eagerly attacked the problems in the shop, but showed the usual "slide along and get through" attitude in the classroom. In fact, the writer has often been asked if it would be possible to spend full time in the shop. Boys are inclined to enroll in trade courses to avoid the classroom.

After groping more or less in the dark for a solution providing the proper amount of correlation, to fit the educational requirements to the individual pupil, and to overcome the impossible task of fitting a group of boys of varying ages, mentality, temperaments and habits of industry to a single rigid pattern, the writer visited the Manhattan Trade School for Girls, New York City, in December, 1923, where the individual assignment plan was functioning. The whole scheme appeared so simple, and had in it so many characteristics of the school shop, that the solution seemed to be to turn the classroom into a shop or laboratory allowing freedom of action, and development of initiative.

The following brief description explains the simplicity of the plan and the way in which it operates. Assume that the morning chapel exercises are concluded and the boys have reported to their home rooms. The instructors distribute the assignment sheets containing the problems and work for a fixed period (at Bethlehem five weeks divided into weekly periods). Each boy has a graph card, which parallels the time or progress card of an industrial shop. As soon as the bell rings for beginning the day's work, the boys separate into groups and go to different laboratories. They are allowed absolute freedom in the selection of these rooms. There are no time schedules for changing from one class to another. A boy may remain in a subject room the entire half day if he desires, or pass from one room to another at will, the only requirement being that the work in the assignment be completed on schedule. An examination of a subject room finds a number of boys working out their problems perhaps in small groups. Others are reporting to instructors and having their work checked. As soon as it is accepted by the instructor, the boy's graph card is marked to show the completion of the problem. A similar check is made on a master chart kept by the instructor. In another room, a number of boys might be in conference with the instructor, receiving assistance or discussing some matter connected with the work. Others are at the board working out problems. The whole atmosphere is one of industry and business. Tables take the place of seats. A reference library is located in each room containing the necessary texts, reference books, and magazines. The usual formal method of teaching disappears. The instructor is no longer the leader, but becomes an assistant and helper.

Realizing that the Dalton Plan, with its many advantages, had a number of disadvantages, and knowing of no boys' industrial school experimenting with it, a considerable amount of time and study was given to the scheme preparatory to trying it out.

The industrial program at Bethlehem includes industrial arts in the junior high schools, a two-year trade school for boys who have reached the sixth grade, and the industrial department of Liberty High School.

On account of its location, rather unusual arrangement of classrooms and limited enrollment, limited both in number and capacity, the trade school was an ideal place to start the experiment.

One or two of the instructors were somewhat skeptical concerning the plan, and it was realized that a considerable amount of additional work would be required of them, due to the individual attention given to the boys, and the checking and marking of the work. However, after visiting the Manhattan Trade School, and spending a month in analyzing Miss Parkhurst's book, it was agreed to try the idea with the advanced classes.

To simplify the preparation of the assignments, one subject was assigned to an instructor, and the shop work and related drawing were eliminated from the plan, because they were on an individual basis. Tentative assignments for a five-week period were prepared, discussed at several meetings, and rewritten a number of times. The outline suggested by Miss Parkhurst was followed in the preparation of the assignments, and the amount of work in each subject was judged according to the number of periods it occurred under the old schedule; that is, if mathematics came five periods a week, the assignments were prepared to cover that amount of work. It was decided at the beginning it would be better to prepare one assignment to fit the normal pupil, and after studying the problem, additional ones for the boys above and below the boys of average mentality.

It is well to remember that the success of the plan, to a great extent depends upon the preparation of the assignment. The chapter in Miss Parkhurst's book on "Writing the Assignment" had many points similar to usual job sheets used in the industrial shop.

Following the preparation of the assignment, purchasing additional text and reference books, printing the necessary forms, and obtaining notebooks for the pupils to keep their assignments, a final meeting was held, and the boys were assigned to home rooms. A ten-minute period was set aside at the beginning of the session to give the instructors and boys an opportunity to discuss any problems that might arise. Tentative schedules were arranged for conferences to provide oral expression, which is one of the chief criticisms of the opponents of the plan, and provision was made for vacant periods for the instructors during which time the laboratories were to be closed. These schedules, together with the related drawing periods were mimeographed and attached to each notebook. Everything that could possibly interfere with the plan was discussed and the first week in April, 1924, was fixed to begin the work.

On Monday of that week the boys in the upper classes assembled in the auditorium and the plan was explained. Although it had been attempted to keep the matter quiet, it leaked out and they were all eager to know about the new method of teaching. Following the general assembly, the groups reported to their home rooms and the instructors went over the plan in detail. The notebooks, assignments, and graph cards were distributed, and the work began. It took several days before the boys got into the swing of the plan, and fully understood the meaning of freedom of action and study. They were accustomed to the teacher leading them instead of following, and being taught instead of learning.

One of the biggest problems was to get the boys to properly budget their time. They crowded into the rooms that appeared to have the easier work, and it was some time before they recognized the need of a proper distribution of time to be spent on a subject.

An immediate effect of the experiment was the marked change of conditions in the rooms. They took on the appearance of a work shop instead of a lounging room in a hotel. The majority of the boys seemed to grasp the idea and it was interesting to see how many brightened up and showed an interest in their work. The problem of discipline disappeared, giving the instructor more time to teach. The instructors were able to get into closer agreement with the natural movement of the boys' minds, without the loss of the element of stimulus and guidance.

However, it was not long before a few of the difficulties we had expected occurred. The slow and dull boys were not keeping up with the assignments, and the bright boys completed the work several days ahead of schedule. The schedule for conferences was not satisfactory, and one or two of the instructors were afraid that oral expression was being neglected. Overcrowded conditions in the classrooms at times resulted in a lack of time to examine and check the work properly. There was copying, especially in mathematics. The shirker came to the front. The method of checking books was not satisfactory. Some of the boys were accustomed to the teacher doing all the teaching, supplying the initiative and responsibility. It was evident that the assignments would have to be adjusted to fit the level of the different types of pupils.

The slow boy and the dull boy are a problem in any system, and it was felt that the plan would allow more individual attention to be given to them. Furthermore, the assignments were adjusted to better fit their needs. Although this difficulty has by no means been overcome, after a year's trial, this type of boy is getting more than under the former arrangement, and in many cases has shown marked improvement. At present, the possibility of an adjustment room for the dull boy and the shirker is being considered.

Additional work was given to the bright boy. In a number of cases, as a premium for finishing the assignment ahead of schedule, he was permitted to spend the extra time in the shop on a special project, or in the drawing room and library. It might be well to state that the plan stimulated the reading of books in the school library.

A fixed schedule for conferences did not prove satisfactory, due to the different speeds at which the boys progressed, so it was decided to permit the instructors to call group conferences when desirable. They were used for clearing up difficulties in previous work and presenting new material to supplement the assignments. Especially was this true in mathematics and science not only at the trade school, but at Liberty High School.

Although oral expression seemed to cause some worry, it was found that the matter would take care of itself through conferences, group recitations, and the ten-minute period set aside for a general discussion.

There is one thing about the plan: it may necessitate additional teachers on account of the amount of

individual attention required to be given to the pupils. At first this was a rather serious problem in Bethlehem. The overcrowded condition in the rooms was partly overcome after the boys learned to properly budget their time. In fact, this problem has disappeared at the trade school.

The handling of the boy who copied, by that is meant the next thing to cheating, was soon adjusted. Individual tests brought out his ability. There was no objection to boys forming into groups to discuss their problems; that is one of the advantages of the Dalton Plan. It was the boy who deliberately cheated that concerned the instructor, as for instance, the boy who transferred another boy's mathematics problems to his own sheet and expected to have it accepted.

The shirker will always be in a class by himself. The individual assignment plan, however, pushes him to the front. It is no longer possible for him to hide behind the skirts of his fellow classmen. He either must come across, or stand in ridicule by the others in the group. There was recently a case of this kind in one of the groups at Liberty High. The boy was keeping the average of the class down. The boys organized a council and sent him a polite request to get busy or look for a job elsewhere. It surely had its effect. A similar boy at the trade school remarked that he was unable to look out of the window while the teacher lectured.

In order that the plan may function properly, it is necessary for each subject room to have its own library of text and reference books, so that the pupils may have ready access to them. This, of course, has necessitated some sort of a checking system. The books were numbered and the pupils required to write their name and book number on the board when taking a text. The name was erased upon returning the book. This is not the most satisfactory scheme and requires further study.

The problem of getting some of the boys to settle down from the mass instruction plan to the laboratory method so that there would be a proper distribution of initiative and responsibility between the teacher and pupil, and a sufficient amount of effort and study, required guidance and supervision.

One difficulty familiar to industrial schools operating under the Smith-Hughes Act is the amount of work that must be covered in three hours, since half the day is spent in the shop. The Dalton Plan helps materially to solve the problem.

Miss Parkhurst suggests three types of assignments: maximum, medium, and minimum. It was evident that the medium type would not fit the needs of all the boys. As stated above, additional work was given to the bright boy and the requirements expected from the slow boy reduced. In fact, the history instructor substituted other problems in place of the regular assignments. The beauty of the whole plan is its elasticity. It is not a cast-iron scheme but can be adjusted to meet a variety of situations. The results from the experiment were so satisfactory that beginning with the opening of the term last September, the entire school was put on the plan and the requirements for graduation changed from 2,800 hours to the satisfactory completion of the shop course and eighteen five-week assignments in the academic and related subjects.

Without the whole-hearted cooperation of the instructors at this school, the plan would never have succeeded. They learned more about the boys and their subjects and have since prepared new course analyses.

During the experimental period at the trade school, the industrial faculty at Liberty High was studying the plan and working out the best method for adapting it to the pupils of high school grade. A number of visits were made to the trade schools, followed by a trip to the Manhattan School.

The scheme was put into operation in all grades in this department beginning with the opening of school in September, 1924. It was necessary to turn the classrooms into laboratories; tables took the places of seats, and book shelves were built to accommodate the additional supply of required texts.

The preliminary procedure was similar to that at the trade school. It was not long before we discovered that new problems were arising. One hundred more pupils with one extra assignment teacher, require additional checking and marking of work. The assignments for the lower classes were too long. Subject rooms were too small, causing overcrowded conditions, especially in the English room, which was shunned until near the end of the first assignment period. This brought out the fact that subjects requiring an unusual amount of reading, of perhaps an uninteresting nature, were not relished. The mathematics instructor found that a number of conferences would be necessary to supplement the assignments. Social Science is to a great extent an informational subject, and the instructor in this laboratory felt that the plan might have a tendency to interfere with the class discussions by the pupils.

Many of the freshmen as a result of eight years' instruction under the mass teaching method had not acquired the proper tools of knowledge for the adolescent period of development, and were unable to study and solve problems. They lacked the ability to budget their time and grasp the responsibility of initiative and study. The plan should begin in the fifth or sixth grade. These boys were tempted to follow the line of least resistance. The condition also existed among the sophomores and a few juniors. The chief objection of the opponents to the plan in England is their disbelief in the power of the boy to control himself and the use of his time. Evidently they are not familiar with the freedom of the industrial shop.

The subject rooms were not as ideally located as at the trade school, which, although the discipline problem disappeared in the laboratories, offered opportunities to waste time. It was not long before the shirkers organized to put the plan on the rocks. A rumor was circu-

lated that the scheme had been tried elsewhere and found a failure. In fact, those boys boasted that when the examination time came they would be conspicuous by their absence. They also encouraged the report that it was impossible to get work checked, due to overcrowded conditions. Of course, they did not realize that the examinations went on daily.

The elimination of home work did not have the desired effect. In the mind of the writer, this is one of the outstanding features of the plan. Too much is expected of children outside of the classroom today. There should be more freedom of action after school hours. The Dalton Plan provides a method for doing home work in school, which after all seems to be the proper place. There was a tendency on the part of the brighter boys to race, and do the work in a slipshod fashion. Bear in mind, most of the trouble was with the lower classes. The juniors and seniors soon adjusted themselves to the new environment and showed marked improvement. They were beyond the adolescent period. The scholastic averages for these two classes was higher at the end of the half-year than during the same period last term. At the close of the first five-week assignment, many of the graph cards in the lower classes showed very little progress, and only slight improvement at the completion of the second period.

Many hours were spent in conference over the situation. The instructors were untiring in their efforts to help solve the problem, and although at times the outlook was discouraging, they stuck to the ship and brought order out of chaos. By January 1st, a majority of the difficulties had been adjusted. In order to overcome the crowded conditions, it was decided to limit the number of pupils in an assignment room at any time to thirty. The social science laboratory instructor assisted the English subject teacher to examine and correct the first English assignment. The assignments for the lower classes were reduced. As a further check in this matter, a number of boys of average mentality were picked from each class, and required to record the actual time taken to complete the different assignments. This data was very beneficial in the preparation of later contracts. It was also brought to the attention of the pupils that the assignments were prepared on a basis of the amount of time that had been given to the different subjects in the classrooms under the former system, and that the time spent on each subject be budgeted accordingly.

The science room became a real laboratory. It was not unusual to see a group of boys, working an experiment, another group reporting to have their work checked by the instructor, while others were solving problems at the laboratory tables. The crowded situation made it difficult at times for this room to function properly, so the instructor arranged a series of questions on each assignment, which were given to the boys when reporting. They were required to prepare written answers to them, thus giving the instructor more freedom to supervise experimental work. The objection to this is lack of oral expression. The difficulty in this shop was further lightened when the group plan of reporting was started.

The big problem as stated above was to get the boys, especially those in the lower classes, to understand what it really meant to study, be independent, and see the proper relation between teaching and learning.

At the end of the first quarter, it was generally agreed that the jumping off point, as Allen calls it, from the old system to the new was too abrupt, and that a gradual transformation would have to take place. The result was that the boys in the freshmen and sophomore classes who were behind in their assignments, were put on a schedule for reporting. They were assigned in groups of three and four according to classes and work completed. The schedule called for a weekly report to each subject teacher on the work of the previous week. Fifteen minutes to a half hour was allowed for examining the problems. The boys understood that they would be taken off the schedule as soon as it was shown they were capable of going ahead. From then on, there was a marked improvement. The schedule stopped the wasting of time to a great extent, and helped to take care of the shirker.

As a further encouragement, a graph chart showing the progress, and scholastic record of each class, according to trades, was prepared and posted in the different rooms. It seemed to create a spirit of rivalry among the different groups. The draftsmen stood highest and in order to obtain a better record, organized a council to discuss the various problems connected with the work.

The group plan of reporting was carried over to the boys not on schedule, that is, it was suggested that they group themselves according to their progress and report together. The result was that the problem of checking and examining the work, due to overcrowded conditions, was somewhat overcome.

As a means of abridging the gap mentioned above, it was decided to put all incoming freshmen last fall on schedule, for at least three months, and supplement the assignments with numerous conferences.

The question of home work did not arise at the trade school because it was never required. In the beginning, it was not permitted at Liberty. However, after five weeks of experiment, it was decided to permit the boys behind in the work to take the assignments home, provided a report was made to the subject teacher the next day. It was later discovered that boys who made poor grades the first quarter informed their parents it was due to the fact that they could not work at home. In fact this excuse has been used ever since. The racing by the bright boys was checked by requiring them to do the work over, in some cases several times.

In the beginning the boys were given absolute freedom in the working out of the assignments. By the end of the first period, the graph cards showed that some subjects were completed and in others nothing had been done. In order to equalize conditions, a rule was made

requiring the completion of a week's work in every subject before continuing with the next week's assignment. Due to the rather crowded conditions, boys often completed the work but could not get it corrected before the end of the week. The result was that the instructors, whose assignments had been checked, permitted them to continue without the work checked in the other subjects. The boys took advantage of the opportunity, and by the time they were put on schedule and grouped, this condition had reached a point where it was impossible to remedy it. In order to avoid a recurrence all under classmen are required to complete a week's work in every subject before continuing with the next problem.

No doubt the question has arisen in your minds as to why a plan of this kind should be put into the schools when it has so many apparent difficulties. It is very easy to make a mountain out of a mole hill. The problems made the work more interesting. The advantages of the individual instruction plan far out-weigh the problem connected with it.

The unfavorable reactions of the instructors were included in the problems just presented. The favorable comments may be summarized as follows:

1. Development of self discipline.
2. Instructors better able to guide pupils in preparation for life.
3. Development of the boy's attitude of personal endeavor.
4. Improvement of silent reading and written expression.
5. Pupils forced to work out things for themselves and properly budget their time (two important life habits).
6. Pupils can begin any time.
7. Ideal plan for teaching geometry.
8. More actual work done.
9. No instructor who has taught under the Dalton Plan will teach under the usual system as he previously did.

The viewpoint of the boys in the upper classes concerning this new idea in education may be summarized in a report on the Dalton Plan, prepared by one of the seniors (a printer). He is a pupil of average ability. The article is given verbatim.

"The complexity of human nature may best be seen in a boy. Especially so in boys between the ages of 12 and 18 years. Some boys are inactive, others industrious. These are the extremes, however, and boys may be found who have varying natures. In fact, a boy may be lazy at three o'clock and aflame with ambition an hour later. It has been said that no two blades of grass are alike. Be that as it may, it is also certain that no two boys are alike. The two institutions which exist solely to help the individual boy find and follow the proper trail in life are, the boy scouts of America, and the public schools.

"Among the various public school methods of education is the Dalton Plan. The Dalton Plan is so constructed that its program is admirably adapted to the new educational philosophy of recognizing, meeting, and utilizing the individual differences in boys. Progress is by no set group method, but it is individual, suited to the speed or slowness of the individual boy. When he is prepared, he presents himself for examination.

"The Dalton Plan is one that works from within and expands outward. The boy is no longer one of a class. He is made conscious of his own future-building, and he becomes a businessman in partnership with himself. No other method so strongly develops initiative. With the guidance of competent instructors, this boy, who is honestly in partnership with himself, can be made a man whom others will recognize as a success.

"As a general rule, a boy will do things even if left to his own creative ability. The problem is to get him to do certain things which will benefit him. He will form habits, and the problem is to guide him into forming good habits. The Dalton Plan gives the boy an opportunity to do things and to form habits without the consciousness of being forced to do it. It is true that he realizes what will happen if he fails, but if he is honestly in partnership with himself, he will not fail.

"The system is so constructed that the backward student may obtain more help than he would if he sat in a class. This is of great value in mathematics. In a class a boy may travel with his classmates for a week without understanding the problems. He may hesitate to admit his faults before the class for fear of open ridicule, and he soon finds himself unable to understand the advanced work. Whereas with the Dalton Plan, he will not be forced into a speed too great for his understanding. He will proceed just as rapidly as his mind permits, which, I think, is better than being dragged through a long period of misunderstanding.

"The Dalton Plan greatly aids the boy to pass from home control to self-direction. I believe it helps far greater than the class method. In the class the boy is told what to do and when to do it. To me the Dalton Plan is by far the more democratic of the two, and that is why I like it best. The Dalton Plan develops in a boy initiative and conscious control over himself. It is up to him to produce the goods, and he doesn't have to stay after school if his work is the least bit late. On the other hand, if he takes a pride in his work, if he is interested in building his own character, and he probably will be, he will be up to the minute, if not ahead of schedule.

"There are some who dislike the system, but if you will investigate, you'll find that no system appeals to them, so what's the difference? Some object to the amount of work required, but if that amount were cut in half they would still object, so again, what's the difference? It simply means that those kickers have not yet learned how to spend their time to their own advantage.

"There were times when I disliked the system, but I have found that the few petty faults are offset by such great advantages that I prefer to overlook the less important, even if I am required to make greater effort. Everybody has heard that nothing worth while is accomplished without real honest effort. I consider the winning of a Liberty high school diploma a worthwhile feature, and I am perfectly willing to do my best to be worthy of its ownership.

"Some boys claim that too much effort is required to obtain the credits. I don't agree. I believe their

powers of concentration are undeveloped. When a boy takes five minutes to open a book and then stares into space for an equal period of time, and complains that the schedule is too severe, I believe he is making an unjust complaint. If some boys would spend as much energy in actually doing their work as they spend in dodging work, I believe they would be weeks ahead of their schedules.

"To me, chemistry is a difficult subject, but I like it just the same. If I had to sit in a class and try to appear intelligent while a well-meaning teacher bubbled over with eloquent chemical terms and juggled colored powders in one hand and glass receptacles in the other, I would undoubtedly pray for the Dalton Plan, which would permit me to share in the activity."

Wells states "there have been three chief phases in the history of educational methods in the last five centuries: the phase of compulsion, the phase of competition, and the phase of interest." Formerly pupils went to school to get what it had to offer. Now the boys go to satisfy a definite need for self-development. One reason for the growth of industrial training during the last century. Boys naturally like to learn. They possess great curiosity, but they must be interested in the subject. Their minds cannot be considered as empty vessels to be filled at the discretion of the teacher with "Imperial gallons of fact." The problem must be attacked from a common sense viewpoint.

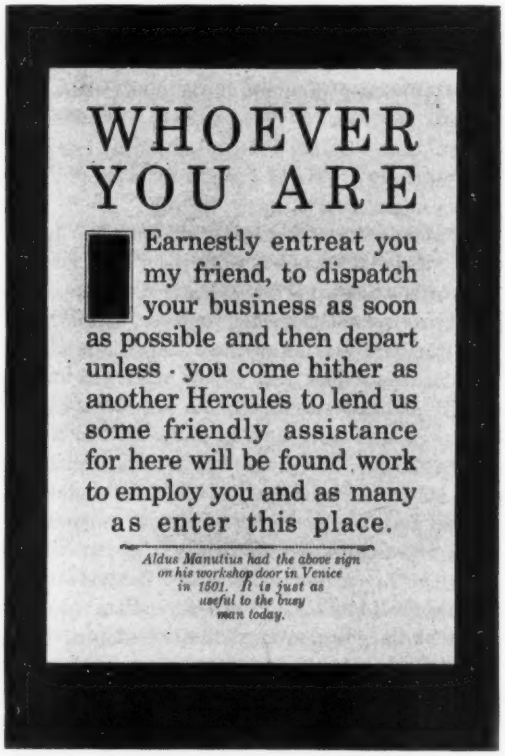
The writer does not wish to be understood as saying that the Dalton Plan is the solution to the whole problem, but he does believe that it is one of the most sensible ideas that has been developed in recent years.

Teaching and learning which are correlative occupations are adjusted to one another under this plan. There is the proper distribution of initiative and responsibility between teacher and taught. The boy becomes a partner in the management of his new life. Independent thought and conduct are developed. The customary school time table and system of classes are abolished and freedom of action and disposition of time take their place. The pupil is not required to stop abruptly in an interesting subject and pass to another class. The rooms take on an appearance of a shop. The slow and fast boy are given equal opportunity. They can experiment until they find the proper plan to work and organize their studies. The work problem is squarely put before the pupil, resulting in the development of judgment and character. The instructor is given an unusual opportunity to study the psychology of each pupil. A striking example of this occurred at the trade school recently. One of the supposed underweight boys who had been behind in his work, suddenly took a new lease on life and reported fifteen days' work in one day. The individual instruction plan offers an unusual opportunity for close correlation with other subjects. The school no longer becomes a large machine grinding out a standardized product, but rather might be termed a specialty shop.

Briefly summarized, some of the advantages of this type of instruction over the usual mass class method are:

1. Proper balance between teaching and learning.
2. Coordination with other subjects.
3. Useless repetition avoided.
4. Problem of home work adjusted.
5. Each pupil can set the pace necessary for doing his best work, and see what is ahead of him.
6. The instructors are in touch with the work of the individual pupil.
7. The responsibility for doing the work shifts from the teacher to the pupil.
8. Responsibility and initiative are developed for the pupil must plan his work and budget his time.
9. The pupil has to carry out instructions, an all important attribute for the successful worker.
10. Discipline problem disappears.
11. Freedom of action—social and civil cooperation are developed between pupils in work and movement from class to class. Of course, it is necessary to have freedom within the law, for law is the mother of freedom.

The individual instruction method helps to solve the problem of how to secure from the vast volume of educational effort expended in schools, a richer harvest of individual culture and efficiency and the principles upon which the Dalton Plan are based will be a material factor in the future problem of educating the youth of this country.


WHOEVER YOU ARE
I Earnestly entreat you my friend, to dispatch your business as soon as possible and then depart unless you come hither as another Hercules to lend us some friendly assistance for here will be found work to employ you and as many as enter this place.
Aldus Manutius had the above sign on his workshop door in Venice in 1501. It is just as useful to the busy man today.

WALL CARD DESIGNED AND PRINTED IN THE RAYEN HIGH SCHOOL, YOUNGSTOWN, OHIO, UNDER THE DIRECTION OF MR. FRANKLIN P. ERCK, INSTRUCTOR IN THE PRINTING DEPARTMENT.

Reducing the Cost of Industrial Education

B. B. Burling, Boys' Technical High School, Milwaukee, Wis.

INDUSTRIAL education, as its name implies, is primarily education for industry. A moment's consideration of the initial cost of machinery, tools, bench equipment, supplies, etc., will convince anyone that there is to be expected a greater money investment in this form of education. This is, however, no real argument for neglecting such an important part of our educational system. All kinds of industrial training do not cost the same any more than do different kinds of professional training. Consider the metal trades in comparison with the woodworking occupations. The equipment for metal work far exceeds that necessary for woodwork. This is partially due to the larger amount of machine work in one trade than in the other. This also should be no substantial argument to neglect the metal trades classes in our large industrial centers. The question which naturally arises is: "Upon what basis are we going to judge the efficiency of education?" Can it be upon the basis of cost per pupil?

Would it be fair to compare the efficiency of a law and an engineering college purely upon a per capita cost basis? You will say: "That is ridiculous, yet how often we find ourselves (educators) falling into this same trap and making comparisons which careful thought and investigation would stamp as ridiculous? The per capita cost of pupils and graduates are very important items and should be considered with respect to all our branches of education, not for a pure numerical comparison, but from an economical standpoint, to conserve our resources without jeopardizing our product. Rather than judge the efficiency of our schools or departments on the per capita cost basis, would it not be more fair to judge them on the basis of the product which is turned out?

Does the product of our industrial departments fill a definite place in society and industry? Are we trying to supply wood workers for the metal industry centers of our country, or printers and electricians for the rural communities? It is not so much the cost of our product with which the public is fundamentally concerned as it is the usability of that product. If our graduates supply a definite demand of industry and if they fill a definite place in society, the question of cost will disappear. We should, however, not be blinded to the value of an occasional self-analysis to determine if possible how we can modify our methods to better our product at reduced cost.

Reduced cost to the public does not of necessity mean a lessening of equipment and supplies, increasing the number of students per teacher, or cutting overhead, but of increasing the efficiency of operation. To those in our schools who are familiar with scientific management, production methods, foremanship training, and other topics which so vitally concern the efficiency of operation in industry today realize that our schools are passing through an evolutionary period. Education for education's sake is passing and education which satisfies the needs of society is taking its place. Education, whether vocational or general, should be functional. It is not unreasonable to expect that industry will place the same eye of scrutiny upon the industrial departments of our schools which it places upon its own shops. The paramount question in industry today is: "How can manufacturing costs be reduced without reducing the quality of the product?" The same question is being asked of our schools today.

There are many questions arising in a discussion of the efficiency of our industrial schools or departments. The classification given below will serve as an outline, but it is by no means exhaustive: (1) Student turnover; (2) waste; (3) productive work; (4) overhead; (5) size of classes; (6) scope of school work; (7) use of school plant; (8) cooperation with industry; (9) vocational guidance and placement.

Material which is received in our factories is inspected, tested, and analyzed to see if it is fit for the product manufactured. In our schools, too little is being done to determine the character of the raw material entering our industrial departments. The result is an excessive student turnover. We try to explain this turnover on the basis of family necessity, desire for money, industrial conditions, etc. These are natural causes for an all-too-early induction into industry, although these reasons cannot adequately account for the situation found in so many of our schools. Our industrial departments suffer the greatest loss. Is this not in some measure due to the fact that pupils who have failed in the socalled standard courses are advised to try some industrial course? To be sure this "cut and try" method saves some, but the cost of this method of salvation is excessive. Surely a study of student abilities in the light of trade requirements will aid in properly advising and placing the pupils within our schools. The use of suitable tests given all entrants into our specialized schools and the breaking up of our courses into shorter units will in time not only reduce the student turnover, increase the percentage of those who actually graduate, reduce the per capita cost, but also increase the quality of the product which is turned out. The reaction will be the establishment of a better relation between school and industry.

The product of the school, as mentioned above, is its graduates, but the by-product is the articles manufactured by the students, and it is with reference to this by-product that we shall now confine our attention. It is not to be expected that students when learning can entirely avoid waste, but there are effective methods of practically eliminating any monetary loss due to scrappage. Should not the student purchase the raw

material used in the manufacture of a selected project? How much better this would be than purchasing the finished article at a predetermined price. If a price is right for one individual is it not necessarily right for all? The student who is careless and spoils material should pay for the same. This would be a strong incentive for the student to do "perfect work."

The standardization of the projects from which the student selects the work most suited to his ability and desire, would make it possible to have all material ordered and cut to advantage and with considerable less waste. In addition to this saving, many of the materials which now reach the scrap pile of the average wood shop, can further be utilized for project making in the lower grades. There is bound to be some waste, but let that waste be as small as possible.

The question of handling, storing, and selling scrap is just as important a factor to be considered in connection with our industrial shops as it is with modern industry. Should not waste lumber be sold? And, should not paper, wire, steel turnings, etc., be properly baled and stored until the market is right?

A question confronting every shop teacher today is: How can I handle my shop so as to turn out a product which will fit into industry? Involved in this question is production. The idea which seems to hold the attention of most industrial teachers is to eliminate so far as possible exercise for exercise sake, and substitute the making of articles which will have a definite value for the schools, community, home, or industry. This question of production is of vital consideration in any topic on industrial education. Herbert Hoover recently voiced this same idea with respect to our government when he raised the question: "Should not more (effort and money) be devoted to productive services? And would it not be false economy to reduce expenses without considering primarily which are productive?

In the arrangement of a shop course it must be understood, of necessity, that instruction is *first in consideration* and the project, whatever it may be, a table, pair of calipers, electric toaster, or a house, is only a means to that end. Although repetition is necessary to develop a certain amount of speed and accuracy, it can be much overdone if the instructor loses sight of the goal toward which he is directing the pupil, and thinks only of production. An over-emphasis in the production of articles in "wood or stone" will tend to limit the breadth of trade training and develop mere "machine hands."

Are our industrial schools serving society most when they turn out only machine operators? Few of us would want to admit this, yet how many of us have not at times seriously considered production methods with a thought of their possible use in our schools? No school can hardly or would want to teach production as it is practiced in industry. "In fact, if our schools served only as production method schools, there would be little reason for their existence." Young men and women would no longer crowd our industrial departments, but would go where they can get pay for their labors. The big asset we have and the magnet which keeps our shops filled is the fact that we train thinking men and women, not mere machines.

Up-to-date machinery should be used, not primarily for production of a by-production in wood or iron, but for our product in thinking manhood. Such machinery when properly used will speed up the instruction in the shops and permit a greater expansion of our curriculum.

The manufacturing trades can find abundant opportunity to make projects in the school shops which will be useful to the home or school. The building trades, however, cannot use the shops to the greatest advantage in the construction of a marketable product even though portable houses are made. In certain parts of the country this problem has been partly answered by the building of "life-size" houses under the guidance of the school instructors. Such a plan gives a rare opportunity to all building tradesmen as architectural draftsmen, concrete workers, bricklayers, rough carpenters, plumbers, steamfitters, tinners, electricians, inside carpenters, and painters, can all be given a chance at real commercial work. It is needless to say that such projects when properly coordinated with classroom instruction, will not only raise the standard of the school's main product, but will give the school a known value to the community and the often heard cry of "costs!" will disappear. In fact, the public will become convinced that the school, and the industrial department in particular, is a tremendous asset, and not a liability, to the community. The production of salable articles, however, as mentioned before, must not blind our eyes to our main task, namely; to impart information, to discuss causes and effects, to unfold the student's mind to the processes, possibilities, and opportunities wrapped up in industry and to develop sufficient technical skill to make the student self-supporting when inducted into industry.

Every shop man knows that a variety of projects is necessary to develop an "all around" tradesman. A cooperation between the purchasing and repair departments of our city school systems and our industrial schools will open up an avenue through which as great a variety of jobs can be obtained as the facilities of the shops will permit. Disastrous results have sometimes followed such cooperative endeavors, but the consensus of opinion, expressed by several, in reply to a questionnaire, was voiced by one in the following statement: "Our trial of this method met with a sudden death when the repair department sent in a *rush* order and demanded 24-hour delivery."

Such a situation evidently indicates a gross lack somewhere of the proper conception of our schools and their true objectives. Cooperation with the repair department is considerably more difficult than would appear at first thought. The school shops are not always in a position to do all the classes of work desired

because assignments should only be made to students qualified to do the work. Many jobs are frequently undertaken which are far above the working intelligence of the student. This is especially true at the beginning of the school year. To illustrate: The electrical shop of a well-known school was asked to rewind an auto-starting motor armature. The students who had become proficient in such repair work had recently graduated, and the younger students had neither the knowledge nor experience to do the work satisfactorily. An attempt was made to have the best available student do the work, but in spite of careful supervision, the work was very amateurish and defects developed. The work was not satisfactorily completed in the time specified, with the result that the school received a "black eye."

Under like circumstances, many an instructor has felt himself forced to do the work himself, and neglect his instructional duties, in order to satisfy some "customer." Is this fair to the school, the instructor, or the pupil? Repair jobs are valuable *as a means* of instruction, but it is impossible to guarantee the time of completion of such work without jeopardizing the interests of the school. With a thorough understanding of this situation, however, a cooperation between the repair department and the schools would mean a considerable saving to the school system and add credit to our shops.

In connection with the purchasing and supply department, the difficulties suggested with respect to the repair department are seldom evidenced as the time element is generally not so important a factor. The projects which are available through these departments are almost unlimited. Chairs, tables, desks, drawing equipment, lathes, drill presses, and printed matter are only a few of many commercial articles which are being made in the school shops of this country as a part of the student's training and education.

The question which is heard occasionally is: "Can production and the right kind of education be carried on together, without sacrificing either the one or the other, or both?"

In some schools, the pendulum has swung from the one extreme of giving only instructional work through suitable projects to the other extreme of organizing the entire school shops on a productive basis. There are supporters for each type of instruction, but without doubt the great proportion of our shop instructors favor a medium between these two extremes. It will not be necessary to enumerate the many possible shop organizations which are at present being used, but simply to call attention to four notable methods where production and instruction seem to be most harmonious:

1st. Organizing the entire shop on a productive basis so that every article made eventually finds its way into some useful piece of furniture, machine, etc. Commercial pressure is, however, eliminated and considerable time is devoted to individual instruction.

2nd. Dividing the shops into instruction and production sections, with special instructors and foremen over each section. The students are shifted from one to the other as ability and necessity demands.

3rd. Dividing the shops into instruction and production departments and shifting the groups of students periodically as is done in the so-called cooperative system of industrial education, only that the shifts are made entirely within the school.

4th. Organizing the shops for instructional work during the regular school year (because of more or less interruption due to necessary allied academic work) and running the shops during the summer vacation period on a productive basis.

A detailed statement of the advantages and disadvantages of each plan is unnecessary here. The only object of mentioning the several of the shop organizations, now in use, is to further emphasize the fact that the schools are endeavoring to *reduce the cost of industrial education* by producing not only a product which can readily be absorbed by industry, but in producing a by-product which has a marketable value.

"Overhead," although of tremendous import, is seldom considered by the school in the same manner as does the manufacturer. The general tendency, in some schools, is to cut overhead, especially salaries, with little or no consideration for the product. There are several methods by which the overhead has been reduced. An analytical study of these methods is not within the province of this topic, although an enumeration of some such devices will probably help more clearly to solve some problems. Every supervisor's experiences will probably add to this list which includes: (1) Cutting teachers' salaries; (2) securing the teachers who bid the lowest; (3) increasing the size of classes without respect for the grade or subject taught; (4) increasing the length of school day; (5) increasing the length of school year; (6) using students as instructor assistants so as to apparently, as far as records are concerned, show a low per capita overhead; (7) using unpaid student help in stock rooms; (8) using teachers outside of school hours to do the clerical work which rightly belongs to the office and office force; (9) increasing the duties of academic or shop teachers so that there is no time left during school time to prepare or lay out the work for the next classes.

Efficiency does not always mean working one hundred per cent of the time, neither does it mean increasing the working load to a point where workman (teacher) is not content at his work. Body and mind must be conserved, and any method, used in reducing overhead, which does not only insure a better product (graduates), but also protects the workman (teacher), is not worthy of a place in our educational system. It may be necessary to increase the instructional overhead of some of our institutions in order to meet the above requirements.

Experience has proven that the high priced superintendents, foremen, and workmen are generally the cheapest. Many times the cheapest have proven the

most expensive. Is it not possible that many of us will have to reconstruct our mode of thinking? It may be that we are practicing false economy. An instructor who does not know his trade well cannot teach it as it should be taught. Book mechanics seldom have gotten the touch of industry, and hence cannot turn out industrial mechanics. A "jack-of-all-trades" probably has a place in a "general shop," but seldom is he suitable for a "one trade" shop. If our industrial schools are to maintain the respect and confidence of industry, we must develop tradesmen teachers. In order to do this, we must pay a wage which will attract the best trade material into our schools to take the responsibility of our industrial departments. This may increase the overhead expense, but if the quantity and quality of our product increases in at least the same proportion, there would be no just criticism. *The returns must warrant the expenditure.*

The easiest and quickest method generally used to reduce per capita costs is to increase the size of the classes. This is such a prevalent pitfall that a little reflection on this phase of the topic is not amiss. As most industrial instruction is individual, the proper working unit is one in which no student's time is lost and instructor is working at maximum efficiency. The size of this unit is not the same in all classes, as much depends upon the nature and size of the problem, project, or job, as well as the age and resourcefulness of the pupils. The units in the "manufacturing trades" shops are generally larger than in the building trades so no definite data can be secured which would be at all applicable to all trade shops. Where a project requires considerable time for its completion, more students can be cared for under one instructor than where an exercise or job can be completed in a few minutes. The quicker the work can be done, the more careful or insistent must be the supervision in order to avoid mistakes.

Many of us have tried to "kid ourselves" into measuring our efficiency on the basis of the number of students we can handle. Is it a question of how many we can handle, or how many we can teach? It has been truly said that "perhaps the greatest waste of vocational education of today is the waste of the time of the students through the inability of the teacher to be in ten or fifteen different places at the same time." The conservation of our resources of time is just as important a factor in reducing costs as any other.

Instruction sheets, job sheets, and the like afford a means of increasing the instructional range of the teacher. These devices should not be used as a means of increasing the size of the class, although it has been the experience of many that the use of assignment sheets has greatly relieved the once over-taxed teacher. The danger of stereotyped lesson sheets is that some teachers seem to feel that they are relieved of certain responsibilities. An instruction sheet which is a substitute for the teacher, is not only a detriment to the teacher, but to the pupil as well, because there is little or no opportunity for thought concentration or the development of the reasoning faculty so necessary in a successful upward striving generation. The advantages to be gained from the use of lesson sheets cannot always be measured in dollars and cents, but teachers who have used such aids would not do without them.

What is the program of your school and how does your cost compare with other schools? It may be strange, but it is nevertheless true, that the larger the school program, the more insignificant do the criticisms of our schools or industrial departments become. Should not our industrial schools and departments touch industry at every possible point? Should not the school plant and instructional staff be more available for the industries? Is it beyond the scope of our industrial schools to organize classes for foremen to be held either in the school building or in the manufacturing plant? Most of our instructors are already loaded with responsibilities and naturally are not seeking additional burdens. It is not always possible to use the regular instructors for such special classes, but should this be sufficient reason for our failure to develop new fields of usefulness? Where special work of this nature, covering the instructional, managerial, and supervisional phases of the foreman's job has been offered the school has been richly rewarded, the courses have been more than self-supporting, and a better relationship has been formed between the schools and industry.

Proponents of the "all year" school rightly claim many economical advantages for the system, and although there are biological as well as pedagogical reasons for not organizing an entire school system upon such a basis, there seems to be just as sound reasoning in favor of opening certain portions of our schools to the "all-year plan."

The "all-year" school would keep the plant operating more days a year than is the case in the average school today. Idle equipment is certainly not economical. Whether this equipment is used for regular school work or for the repair and supply departments, is not our main question. Our main question is: Are we using our industrial equipment in the most economical way possible?

Can industry aid us in the solution of this cost problem by greater cooperation? Can our industrial schools succeed as they should without a close cooperation with the industrial world? Let us look into our schools to determine what is lacking then to industry, with the hope that in industry we will be able to find that component part which is so hard to adequately realize in our schools, namely, the industrial atmosphere.

If the school shops are going to be run on a purely productive basis, the school will differ but little from the commercial shop. If "production" is what we need, why is it that the men who have learned their trades in the school of experience take the time away from home and family, after a hard day's work, to attend our night schools? Why is it that they are willing to spend hard earned money for correspondence instruction? There

are evidently some things which the school can teach best and some things which are best learned by rubbing up against real conditions in the "work-a-day" world. To try to commercialize our schools or to schoolize our manufacturing establishments, would be ruinous to both.

The limitations to the project method as such and the cost of equipment gave rise to the "cooperative plan" of education. In this plan, the "projects" are made under the direction of competent foremen under industrial production methods, and the theory is provided in the school. No plan is entirely free from its faults and unless there is the closest harmony between the schools and industry much of a student's time in the shop is lost, as far as learning new ideas is concerned, because "production" is the keynote. This necessitates keeping a workman on a certain job until proficiency is reached and then reluctantly passing him on to other work. The advantage to the public, however, in reducing the cost of such education and in accommodating more students in our schools probably offsets, in large measure, the criticism just raised. There are other advantages from the student's standpoint which makes cooperative courses popular.

The industrial school of the future is bound to be one in which industry will not only play an important part in determining the curricula, but will also cooperate in the training of future employees by taking over to a large degree the shop training of the students in the commercial shop under commercial conditions. Both our educational institutions and the industries do not care to be entirely responsible for this "infant" because of the added responsibility and the scarcity of good shop teachers on the one hand and the lack of "properly trained" apprentices on the other. These two influences will bring these two institutions together to help each other solve each other's problems. When this day does come, industrial education will function and there will no longer be heard the cry of costs! costs!

In addition to this necessary cooperation, between industry and the schools, in the training of our young manhood and womanhood, it seems only logical to expect also a municipal guidance and placement bureau. The duty of this bureau would be to conserve our human resources by preventing a too early induction into industry and safeguarding our youth after induction. It is profligate the loss which is sustained in so many of our commercial centers by our youth, our schools, and industry because the trained product is allowed to drift from our school doors without the aid of a friendly hand. Through financial necessity, an inviting "want ad," or "friendly" advice, we find many of our honor graduates acepting jobs in the treadmill of industry. If this loss to industry and society could be evaluated, the figures would be astounding. Considerable progress is being made in some centers to supervise all juvenile employees, whether in the summer or regular employment, to the end that this tremendous loss be conserved.

Is it not logically a function of our schools not only to properly train our youth, but to properly place them where they will have the opportunities complementary to their training?

To summarize: In connection with our schools, student turnover, material waste, productive work, overhead expenses, size of classes, scope of school work, use of school plant, cooperation with industry, vocational guidance and placement, and other kindred topics are important as they affect to a large degree, the cost of industrial education. It must be borne in mind, however, that although we provide education *in* industry and *through* industry, we must not provide education *for* industry, but for the pupil and society. Having provided this education, the next logical step for our schools is to see that our graduate makes a worthy place for himself or herself in industry.

Under such conditions, there would no longer "be heard in the land" the cry of "costs!" for service has motivated our schools and the industrial departments would no longer be referred to as a "liability" but as a "powerful asset" to the community.

THEODORE ROOSEVELT HIGH SCHOOL, DES MOINES, IOWA.
One of the show places of the Des Moines school system which members of the Western Arts Association and of the Vocational Education Association of the Middle West will have an opportunity to examine.

Another Letter on Mechanical Drawing

R. J. Grant, Senior High School, Appleton, Wis.

At Rent $55 per.
Not furnished. No heat.

Dear Pat:

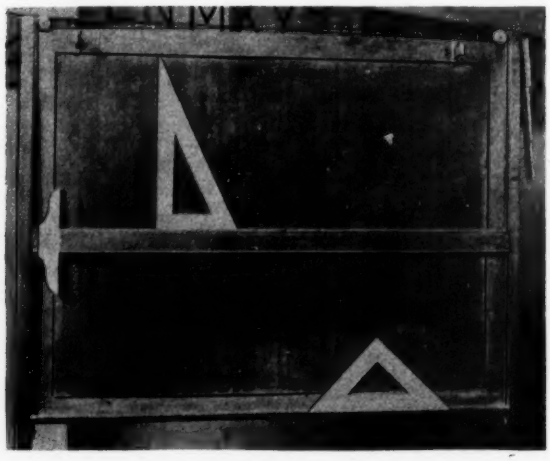
The static is "fierce" tonight, so instead of "listening in", I'll write you. I was surprised to receive so soon "a pink epistle" bearing your return address on the flap. Where did you get the pink stationery? Pat, if you use pink envelopes again, be sure to put your return address on the front of the envelope. If you fail—it is likely to cause suspended moments in our house until I arrive home. To make our surprise mutual, I am answering your letter immediately.

I'm glad that you liked the modeling clay method for aiding the teaching of visualization. Any time that I may be of service to you in your teaching don't hesitate, but "shoot"; I haven't any "closed season". I doubt if you ever believed such, because in glancing over your last "pink sheet" I note you have fired a couple of shots at me.

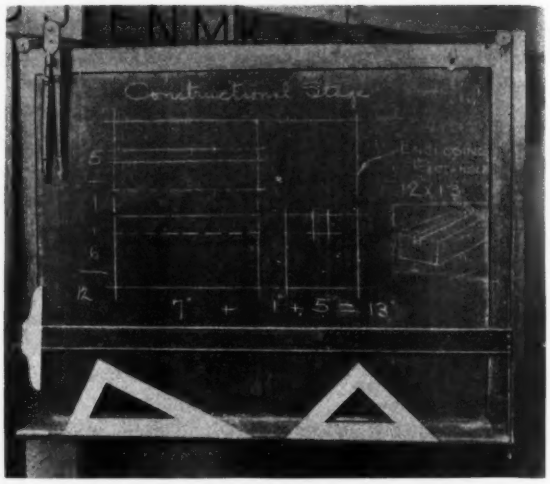
The "load" of those shots was: You would like to know if we have a special device or "do dab" to aid in teaching the mechanics of mechanical drawing to beginners. We have, but before I say a word about our "do dab", as you have dubbed it, I want to give you reasons that prompted the creation of the device.

Let's hunt together. We'll tramp through a few of the various ways that are or might be used in the teaching of the mechanical part of our drawing. To begin with, how do we teach the proper methods and uses of the T-square and triangles? These tools are of great importance, and knowledge of their functions is very necessary. You realize the numerous operations to be taught, involving the use of these tools separately or in combination. I won't enumerate these uses as the list would be too lengthy. Let us discuss briefly a few methods used in the presentation of this instruction.

Is it possible to show easily and clearly the tool combinations on a common blackboard? We may draw freehand on the blackboard these tools in their proper and respective positions, but are we artists enough to make such sketches very readable? How about the time element used in drawing these combinations? It appears to me impossible to lay out a problem mechanically from start to finish by using the blackboard, for freehand sketching eliminates the mechanical tool steps which we wish to show and teach. Pat, here is a tip. *Don't try* to hold up and operate the T-square and triangles against the blackboard. An octopus might be able to do such, but no ordinary person should attempt it. It is useless and you may rest assured that you are trying a juggling act. Experience has taught that you need be only a poor juggler to get the "snickers" from your class.



GENERAL VIEW OF MOVABLE T SQUARE AND TRIANGLES IN ANY POSITION YOU WISH TO LEAVE IT.



THE SO-CALLED "DO DAB." PORTABLE BLACKBOARD WITH SLIDING T SQUARE AND NECESSARY TRIANGLES, SHOWING PROBLEM IN CONSTRUCTION.

Let's take a shot at the textbook method. Poor old textbook. It receives its share of abuse. It becomes the "receiver of the passed buck". It is the teacher without a salary. The only assistant it may have in the room is the so-called "teacher who passes the buck" to it, opens and closes doors and windows, and keeps the house from getting "rough". This "falling into the hands of the book receiver" does occur in our classrooms where mechanical drawing is supposed to be taught. Please don't judge that I am not a believer in textbooks. I think they become a valuable asset to any class if properly used. But, when we go so far as to have the student rely entirely on his text for information, we are going to lessen the confidence that a student may have had in us, or else he will judge us as plainly lazy. Once we are judged such by our students, you may rest assured the community will soon follow suit and have the same opinion. The community will often judge you from the students' point of view. How otherwise may they judge you as they seldom, if ever, visit the school?

But, getting back to our textbook. We have in our various texts some excellent cuts showing our tool processes, but they are motionless and the moving process of instruction cannot be shown. It is true that it is very hard to get beginners to follow instructions. Again, I'll say, please don't believe that I do not believe in a text, but you know an automobile must be cranked to start the engine even though the gas tank is full. The textbook in itself cannot quite accomplish our aim.

We'll discuss our last method, individual instruction, very briefly. There are so many variations here that books could be written about it. I don't want to become an author in this letter. A drawing teacher's job involves a great deal of individual instruction. The problem which we are concerned with is: How are we to teach the preliminary steps to mechanical drawing by the individual instructional methods. Would it be logical to teach each student separately the various stages of the wanted in-

struction? We say NO. Then take the group possibility. We group the class around a drawing bench (standing of course) and with the necessary drawing tools proceed to demonstrate the instructional processes. How many of those twenty *crowding and restless* boys can see exactly what is going on or even see what is being drawn on paper? We may divide them into smaller groups, but what are the other groups doing while waiting their turn? It is almost impossible to present a problem step by step until finished by this method. WHY? The student cannot see lines, especially the faint constructive lines as they are being drawn; and short cuts, dimensions, etc., cannot be shown to an advantage. In other words, the student has not the opportunity of following the problem "through".

Summing up briefly our drawbacks or criticisms: The blackboard in itself fails due to lack of mechanical methods. The textbook is overworked, and though it has much to offer, little is accepted. It has no way of presenting a "through process of instructional steps". We might compare it to a movie of a football game with players in action to a lantern slide picture with the figures immovable. Furthermore, the textbook may be absent from your class with the "good excuse" that it costs too much. The third necessitated that individual instruction must have a foundation for a start. The difficulty was that all the foundations could not be constructed at once. These for the reasons given caused us to initiate into our teaching devices the so-called "do dab". This device for a teaching aid is in our estimation a worthy acquisition.

We came to the conclusion that the blackboard was the place on which to build our foundation and present our demonstration. The students can be comfortably seated in lecture chairs in front of the board. Are you fond of standing in a movie while viewing a good picture? No matter how good the picture, your pleasure and appreciation is lessened due to your discomfort. Apply the same to students. The student while seated can take notes and see every step, short cut, and dimensioning, for bench reference. Is it possible for students to take notes while standing and twisting their necks to see what is going on? The blackboard may have all the figures and diagrams drawn large and to scale, so that all in the class can see plainly—but we mentioned difficulties with the ordinary blackboard presentation.

Enter here our special device. It consists of large wood triangles and a specially constructed blackboard to which we have fitted a sliding or parallel T-square. The

APPLICATION OF T SQUARE TO TRIANGLE.

T-square is easily raised or lowered and remains in position as placed. Geometrical constructions are easily and properly drawn. Orthographic projection, dimension extension, and construction lines, are all drawn mechanically.

We can start with a problem from the start and can complete the problem by the same mechanical methods we wish the student to use. Compare that method to free-hand sketches.

In response to your request for instructions, I'll say that good judgment is only necessary. If you desire, I can send you specifications for the construction of this device. The accompanying photographs will show applications of the "do dab". The same old reason pops up. "Seeing is believing."

I hear my wife calling me. I'm staying up later tonight writing this letter than I would "listening in". That is saying much. Remember the "open season".

Yours,

TOM.

The Duties, Qualifications, and Responsibilities of Directors of Vocational Education

IV. The Training and Personality of Directors

S. Lewis Land, Lecturer, Department of Industrial Education, University of Wisconsin

Among the elements that make for success in the direction of vocational education, the training and personality of the director must be given an important place. He is the professional adviser of teachers, one who leads others to a realization of the worth of the subjects they teach, one who aids not always by direct suggestion but by general guidance and stimulus to higher professional life.

Most of the criticisms made of individual directors center upon the lack of training, or experience, or upon weaknesses in personality. Many of the arguments directed at vocational education itself will be found upon careful analysis to be based upon these same points.

Enclosed with one of the questionnaires filled in by a state supervisor was the following statement with regard to the requirements in his state as to training, experience, and other qualifications of directors: a. "His education must include: graduate of a four-year college course. His college training shall have included a minor in education and at least two minors in technical and engineering subjects." b. "He shall have a practical knowledge of one trade and shall have had experience in teaching or supervising—preferably teaching—in a trade or technical school." c. "The person selected as a supervisor shall have a mature judgment and possess those qualities of leadership that demand the respect of industrial people."

1. Training

Little has been written about the kind of training necessary for the type of leadership involved in the direction of vocational education. A review of the literature

on training programs for directors, and of training programs being carried on by higher educational institutions, reveals the fact that little attention has been given to the formulation of training programs for directors. In very few schools is there a training program mapped out specifically for those preparing for the direction of vocational education.

There can be no doubt that a thorough mastery of the general theory and specific practices involved in the whole problem of vocational education is essential, not only that the direction may be intelligent, but that the teacher's and people's confidence may be gained and held.

It seems fair to insist that the director should have some professional preparation for the position of direction. Ideally, graduation from a four-year course in a standard educational institution would be desirable. In some cases graduate work should be encouraged. This insistence upon graduate work does not necessarily mean, however, that such work fits one for successful direction. A bachelor's degree, or a year spent in graduate study, will not necessarily fit one for direction any more than will long experience. More important than the length of study, or the number of courses, is the nature and content of those courses.

The tendency today is to regard the chief function of the school administrator as that of dealing with the subject-matter of instruction and the process of instruction. The clerical work, the financial details, and general business routine are taken over now almost entirely by the business manager and clerical assistants. As the director is being relieved of this routine, he is expected to give more attention to improving the efficiency of instruction. The more thoroughly the administrator is trained in these functions, the more successful will he be in actually improving teachers in service and of improving the efficiency of their work.

The director should be a good teacher. His training should include a study of the principles of method, which in turn involves a study of the principles of learning. He should be trained in the science of curriculum construction, since one of his major responsibilities is to determine what work should be offered.

Investigation to determine what studies are most useful in real life involves the field of educational measurements. The history of the testing movement, the theory underlying it, and the application of individual tests should be studied. This necessitates work in statistics as applied to education.

It goes without saying that the director should be well trained in school administration. The collection and distribution of public school money, child accounting, property accounting, the conduct of surveys, the construction of buildings, the managing of the physical plant, the keeping and filing of records, the cost and source of supplies, are problems which should be included in his training program.

The reports from the one hundred directors cooperating in this study, indicate that directors of vocational education should be degree men from recognized teacher-training institutions. The principle of individual difference should qualify this, of course.

2. Experience

An examination of data relative to the length and kind of experience of successful directors, indicates that this ranges from many years' experience to very limited experience. It seems fair to insist that the director shall have had as a minimum from three to five years' teaching experience. The principle of individual difference again operates here. Less than this amount of experience will hardly give the familiarity with classroom procedure which is necessary, nor will it beget confidence on the part of those directed. On the other hand, merely lengthening the term of experience does not necessarily insure success.

Some contact with industry, or practical experience at trade or other professional work is very desirable. Eighty-seven of these one hundred directors stated that they had had some practical experience at trade or industrial work.

In general it may be said that the director should have some contact with industry, and should have had some experience teaching in vocational schools.

3. Personality

Certain necessary personal characteristics have been directly mentioned or clearly implied many times in the preceding articles, and particularly in the immediately preceding discussion.

The late L. D. Harvey has listed sympathy, honesty, candor, ability to remain unruffled by displays of temper, and also to remain unaffected by the attitude of those who get praise, as the essential personal characteristics of a director.

The following eleven traits or characteristics are listed in the order of importance as indicated by the combined ratings of one hundred successful directors:

1. Leadership.
2. Executive ability.
3. Cooperation.
4. Reliable judgment.
5. Professional outlook.
6. Tact.
7. Sincerity.
8. Progressiveness.
9. Health.
10. Kindness or sympathy.
11. Personal appearance.

The writer realizes the weakness of this part of the study, because the terms used in this section to describe personal qualities are not objective and are not defined in the same terms for everyone. Moreover, many directors stated that they had difficulty in giving these consecutive ratings.

Many of these qualities depend in large measure, of course, on native endowment, but every-day experience testifies that many of them can be cultivated in marked degree.

4. Deficiencies of Directors

Data with reference to deficiencies of directors of vocational education which have been observed, indicate that the most detrimental influences to the success of directors are lack of personality and lack of training. Other deficiencies mentioned in order are lack of interest, lack of experience, and lack of ability to cooperate with other people.

A Concluding Statement

It is hoped that the material presented in this series of articles will be of some help to directors, to those preparing to be directors, and to those interested in training programs for directors.

For directors there are at least three uses:

(1). It may be used by directors as a basis for self-analysis. By combining his own judgment with the combined judgments here made available, he should be able to better outline his working program.

(2). The trait analysis may be used for self-rating, and by noting one's weaknesses, improvement may be possible.

(3). The analysis of the problem of direction may be used as a job specification.

For persons preparing for direction, there are at least three uses:

(1). The analysis, of the training and experience required, should be valuable as an aid in selecting educational possibilities, and professional opportunities.

(2). The analysis of the traits may be valuable, if an effort is made to develop those desired.

(3). The duty analysis may be considered a job specification, for which job the director is preparing himself.

For those interested in training programs for directors, there are at least three uses:

(1). Courses should be provided which will give training in the several duties listed.

(2). Training facilities should be provided, in so far as possible, as will train and develop the traits desired.

(3). The analysis of the training and experience needed may be helpful in outlining the training program.

The field of vocational education is a special field of work in which little experimentation and little investigation have been carried on. Experimentally determined principles of direction, and the organization of a technique based upon them, will contribute much toward the more efficient supervision and direction of vocational education.

Progress in the direction of vocational education will mean the careful and scientific study of its problems. Mere opinion must give way to facts secured through trustworthy investigation. Investigations conducted under controlled conditions must supercede progress made by blind chance.

All of this means that we must have and the future will see a new type of director. He must recognize that first and above all the improvement of instruction must begin with himself. A recognition of his personal responsibility will keep him alive intellectually.

If the director is to merit and dignify the office he holds, if he is to be imbued with a professional spirit, and in turn communicate it to his teachers, then he must have a true conception of his office and an adequate preparation for it.

Organizing and Teaching Elementary Machine Shop Practice

G. H. Snaddon, Northwestern High School, Detroit, Mich.

(Conclusion)

IV. Laboratory Work

Projects listed under laboratory work in the outline are intended to be suggestive, but have been selected after careful study and experiment with the problem of finding usful projects or worth-while products of interest to boys and still having the fundamental processes inherent for completion as specified. Only those with immediate usefulness or utilitarian value in the home, school, etc., have been included. It is not intended that the student should complete all those listed. The purpose of listing a large variety for each unit is to provide a latitude of choice and to make allowance for individual differences in interests, technical ability, speed, etc. An additional choice within the same and other projects is afforded through having a number of different designs.

V. Method of Instruction

Certain general principles to follow in conducting class discussions and in presenting shop processes are here suggested:

1. Presentation of the work of the class period by means of the problem-project, demonstration, inductive development or "conversational" methods, by an oral quiz, or by means of all, or any of these methods in composite.

2. In conducting discussions, demonstrations, in visiting pupils, etc., stimulate independent thought and action, rather than simply give out information or merely present facts.

3. Make demonstrations brief. Present a few essential consecutive points of primary interest to all concerned. Allow the pupils to see what they can do with the problem or task as soon as possible.

4. Provide for individual instruction and progression through making systematic tours of the class, rendering assistance in one form or another when the pupil has reached the point where he feels the need for additional instruction.

5. Provide for a complete variety of experience for each pupil. Keep him on a special process only until the degree of understanding and skill is developed sufficient to warrant advancement.

6. Use well-planned instruction and job sheets.

7. Make use of charts, catalogs, display panels, exhibits of manufacturing processes, etc., for illustrative purposes.

8. Organize the constructive and manipulative phase of the work on a useful or productive basis.

9. The trade technical subjects and auxiliary information as listed for each unit can be presented to best advantage at the time when the learner is doing the jobs specified for that particular unit. Much of this information should grow out of the immediate work in hand.

10. Plan excursions to manufacturing plants, shops, industrial exhibits, etc.

11. Conduct carefully worked out reviews, tests and examinations.

VI. Measuring, Appraising and Recording Students' Progress

It is intended in these courses that each student keep a careful daily record of his work and progress by means of a progress record card. A copy of the card used for this purpose was published in the Industrial-Arts Magazine, Vol. XIII, No. 1, Page 34 (January, 1924, issue). The chief characteristics of the card are:

1. It provides space for the most important identification data needed for scholarship term reports. Additional data required for unsatisfactory reports, examination standings, etc., can be provided for on the reverse side.

2. It is arranged for use in ten-week, one-semester or one-year (forty weeks) courses.

3. It provides for a complete record of twenty projects including the date commenced and finished, the total hours and minutes required to complete each one.

4. It involves no additional clerical work on the instructor's part. He simply inspects the finished work when presented to him by the student, checks the card in the column for this purpose if the work is satisfactory, then makes the next assignment.

5. By its use the student is responsible for the mark or grade he receives in the course. Periodic and final grades are, therefore, the results of the student's own efforts and not entirely estimates or guesses of his instructor.

6. It takes into account and gives credit for accordingly such basic factors as speed, accuracy, application, industry, use of judgment, reasoning, self-direction, independent thought and action, etc.

7. It provides information of value to the instructor (a) in determining when to advance the student to the next unit of subject matter in the course of study outline, (b) in determining the immediate needs of those studying the subject and the future needs of those returning for more advanced work.

8. It provides essential practice in record keeping.

VII. Selected References

Machine Shop Practice—Kaup.
Machine Shop Practice—Pratt.
Machine Tool Operation—Parts I and II—Burghardt.
Machine Shop Work—Turner, Perrigo, and Fairfield.
Machine Tools and Their Operation—Parts I and II—Colvin and Stanley.
Mechanical Engineering and Machine Shop Practice—Moore.

COURSE OF STUDY IN MACHINE SHOP PRACTICE—9B GRADE

Units of Subject Matter.	Specific Aims, Standards and Objectives.	Teaching Material: Theory and Practice.			Methods and Teaching Devices (Suggestions to Instructors.)
		Topics for Discussion and Research.	Laboratory Work. Processes.	Laboratory Work. Projects and Problems.	
I. Bench Work 1. Laying out.	1. (a) To develop ability to work from blue print or sketch to within .010 inch limits. (b) To understand use and care of surface plates.	1. Laying out. (a) Meaning of term. (b) Methods used. (c) Names and uses of tools used. (d) Surface plates and their uses.	(a) Squaring. (b) Centering. (c) Scribing. (d) Use of surface plates.	Drifts. Combination wrenches. Riveting hammers. Toolmakers' clamps. Clamp dogs. Tool posts. Wrenches—various kinds. Square head screws. Steel square. Firm joint calipers. Hack saw frame. Monkey wrenches. Luggage carriers for auto, etc.	1. Demonstrate proper methods of using lay-out tools to class as a whole on actual piece of work. 2. Review demonstrations frequently. 3. Illustrate important principles by blackboard sketches. 4. References: Principles of Machine Work—Smith; Machine Tool Operation, Burghardt. Part 1. Chapter XIII.
2. Chipping.	1. (a) To be able to do any ordinary chipping job where no accuracy is required. (b) To chip to a line within .015 inch limits.	1. Cutting edge principles. 2. Kinds and shapes of chisels in common use.	Use of hammer and chisel.	Riveting hammer. Tool posts. Wrenches. Calipers. Light castings, Etc.	1. Demonstrate briefly use of hammer and chisel. 2. References: Principles of Machine Work—Smith; Machine Tool Operation, Burghardt. Part I. Chapter XIV.
3. Filing.	1. To be able to produce a true surface by the use of the file.	1. Files and filing. (a) Forms and uses. (b) File definitions. (c) Coarseness of cut. (d) File testing. (e) Modern file manufacture.	(a) Rough filing. (b) Filing to line or gauge.	Drifts. Wrenches. Hammers. Clamps. Clamp dogs. Tool posts. Squares. Calipers. Machine parts. Etc.	1. Demonstrate uses of various kinds of files not already known. 2. Use Disston File Chart for illustrative purposes. 3. References: Principles of Machine Work—Smith; The File in History—Henry Disston & Sons; Machine Tool Operation, Burghardt. Part I. Chapter XIV.
4. Sawing. (Hand.)	1. To be able to do ordinary sawing work to within .015 of an inch.	1. Hack saws and their uses. (a) Factors that enter into the use of hack saws. (b) Selection of saws. (c) Effect of weight and pressure.	(a) Rough sawing. (b) Sawing to line.	Drifts. Wrenches. Clamps. Handles. Stock. Etc.	1. Demonstrate use of hack saw. 2. Use Starrett Hack Saw Chart for illustrative purposes. 3. Reference: "Hack Saws and Their Uses." Published by L. S. Starrett Company; Machine Tool Operation, Burghardt. Part I. Chapter XII.
5. Threading.	1. (a) To develop skill in the use of the tap and die to the extent of tapping a hole straight and making threaded parts fit together accurately. (b) To cultivate the "feel" which indicates strain on the tap so as to prevent excessive breakage.	1. Screw threads in general. (a) Terms used. (b) Thread systems. (c) Tap size drills. (d) Types of dies used. (e) Measuring systems. (f) Lubricants used.	Use of taps and dies.	Clamp dogs. Toolmakers' clamps. Screws. Nuts. Machine parts. Etc.	1. Demonstrate use of taps and dies. 2. Reference: Principles of Machine Work—Smith.
6. Assembling and Machine repair.	1. (a) Ability to assemble machines and machine parts to required accuracy. (b) To be able to do ordinary repairs to machines necessary to keep in running condition.	1. Fits and fitting. 2. Reamers and reaming. 3. Scrapers and scraping. 4. Belt lacing and belting. 5. Materials of construction. 6. Mechanisms and mechanical movements. 7. Related mathematics, science, mechanics.	(a) Drilling, riveting, peening, filing, hack sawing. (b) Finishing, including: Reaming, aligning, use of blue. (c) Threading. (d) Scraping. (e) Babbitting and soldering.	Clamp dogs. Toolmakers' clamps. Toolmakers' vises. Locker handles. Squares. Machine parts. Repair machines (minor). Lacing belts. Overhauling machines. Babbitting and scraping bearings. Jigs and fixtures. Etc.	1. Provide practice in overhauling machines and in machine construction and assembling. 2. Advanced students can be assigned to do necessary minor repairs so as to keep equipment in good running condition.

COURSE OF STUDY IN MACHINE SHOP PRACTICE—9B GRADE

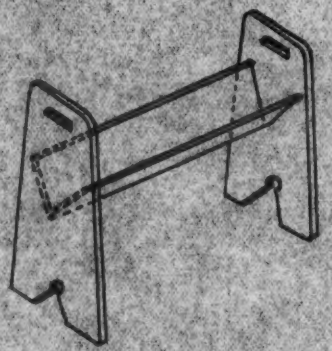
Units of Subject Matter.	Specific Aims, Standards and Objectives.	Teaching Material: Theory and Practice			Methods and Teaching Devices (Suggestions to Instructors.)
		Topics for Discussion and Research.	Laboratory Work		
			Processes.	Projects and Problems.	
II. Drill Press.	1. (a) Ability to drill a hole or series of holes to accurately described circles. (b) To be able to do any ordinary type of drill press work to specified limits.	1. Kinds and types of drill presses in common use. 2. Names and uses of machine parts and tools. 3. Theory and design of twist drills. 4. Speeds and feeds for drilling. 5. Types of drills and drill sockets. 6. Types of commonly used drill chucks. 7. Drill grinding. 8. Jigs, fixtures and special tools for drilling. 9. Lubricants and cutting compounds. 10. Safety precautions in connection with machine. 11. Recognition of stock and its working properties. 12. Related mathematics, science, and mechanics.	(a) Plain and accurate drilling on flat and cylindrical work—small and large holes. (b) Boring — use of reamers, countersinks, counterbores, center reamers, and jigs. (c) Drilling at an angle. (d) Drilling to depth. (e) Grinding of drills.	Centering stock. Drifts. Combination wrenches. Riveting hammers. Ball pein hammers. Toolmakers' clamps. Angle brackets. Clamp dogs. Bench stops. Tool posts. Steel squares. Wrenches (various kinds). Calipers. Locker handles. Sleeves. Strap clamps. Bushings. Castings. Etc.	1. Demonstrate operation of drill press. (a) Fitting drill in sleeve and spindle and use of drill chuck. (b) Methods of clamping work to table and use of drill vise. (c) Adjustments for speed, feed, height, etc. (d) Starting the hole and "drawing" the drill. (e) Use of drill drift. (f) How to grind a drill. (g) Use of jigs and fixtures. 2. Assign different phases of a topic to individuals or groups for investigation and report. 3. References: Modern Drilling Practice, published by Industrial Press; Principles of Machine Work—Smith; Handbook for Drillers, published by Cleveland Twist Drill Co., Cleveland, Ohio; Machine Tool Operation, Burghardt. Part II. Chapters I, II and III.
III. Lathe Work. 1. Turning on centers.	1. To be able to do ordinary types of lathe work on centers to within .001" of required dimensions.	1. Classification of lathes. 2. Names, care, and uses of principal lathe parts, mechanisms, tools, and attachments used. 3. Lathe essentials. 4. Theory and principles of cutting tools. 5. Kinds and shapes of lathe tools and holders used. 6. Calipers and their use. 7. Use of precision measuring tools and gauges. 8. Classes of fits used in machine construction. 9. Manufacture and properties of iron and steel. 10. Finishing and finishing materials. 11. Safety precautions. 12. Related mathematics, science, and mechanics.	(a) Centering. (b) Roughing and finish-turning. (c) Facing ends. (d) Shouldering. (e) Knurling. (f) Eccentric and form turning. (g) Finishing. 1. Filing. 2. Polishing. (h) Use of steady and follow rests.	Bolts, square and hex. Plug gauges. Screws (various kinds). Handles—various kinds. Boring bars. Nail sets. Center punches. Bell centering punch. Surface gauges. Jack screws. Machine parts. Stock support for power saw. Die stock. Milling machine arbors. Lathe arbors. Machine parts. Screw driver handle. Solid tap wrench. Adjustable tap wrench. Marking gauge. Etc., Etc.	1. Demonstrate how to operate the lathe. (a) Aligning lathe. (b) Truing live center. (c) How to center stock. (d) Method of driving work. (e) Adjustment of tail-stock. (f) Grinding and setting tool. (g) Adjusting for speed and feed. (h) Roughing and finishing. (i) Use of calipers and micrometers. (j) Locating shoulders. (k) Filing and finishing. 2. Give periodic reviews, tests and examinations. 3. For illustrative purposes use 3'x5' blue print, published by Monarch Machine Tool Co., Sydney, Ohio; also Junior Lathe Print. 4. References: Advanced Machine Work—Smith. Sections 1, 2, 3, 4, and 5; Machine Tool Operation—Burghardt. Part I. Chapters II to VII, inclusive.
2. Taper turning.	1. Ability to turn and fit tapers accurately to gauge. Limits $\begin{cases} -.001 \\ +.001 \end{cases}$	1. Tapers and taper turning. (a) Standard tapers: Morse; B. & S.; Jarno. (b) Calculating tapers. (c) Methods used in cutting tapers. (d) Measuring tapers.	(a) Tail-stock set over. (b) Taper attachments. (c) Compound rest.	Lathe centers. Center punches. Nail sets. Sleeves. Handles. Taper ring gauges. Taper plug gauges. Taper shank tools. Taper reamers. Bevel gear blanks. Chuck arbors. Collets. Nut mandrels. Taper pins. Milling machine arbors. Etc.	1. Demonstrate: (a) Setting over tail-stock. (b) Setting tool. (c) Use of taper attachment. (d) Use of compound rest. 2. Illustrate by blackboard sketches or use illustrative material to show the principle of turning a taper. 3. References: "How to Run a Lathe," pages 79 to 88, inclusive; Machine Tool Operation—Burghardt, Part I, Chapter IX.

COURSE OF STUDY IN MACHINE SHOP PRACTICE—9B GRADE

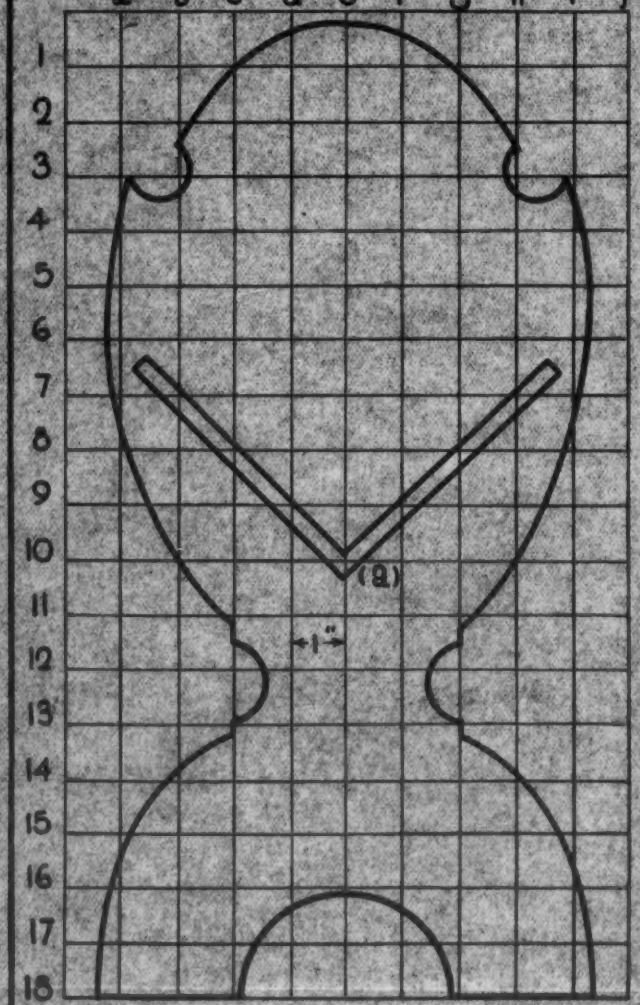
Units of Subject Matter.	Specific Aims, Standards, and Objectives.	Teaching Material: Theory and Practice			Methods and Teaching Devices. (Suggestions to Instructors.)
		Topics for Discussion and Research.	Laboratory Work. Processes.	Laboratory Work. Projects and Problems.	
3. Thread cutting.	1. Student should be able to cut V. or U. S. S. thread, outside or inside, right or left hand, to fit nut or gauge accurately.	1. Thread cutting in the lathe. (a) Meaning of terms: "pitch," "lead," etc. (b) Gearing for thread cutting. (c) Screw threads and thread proportions. (d) Standard threads and thread systems. (e) Thread measuring systems.	(a) Thread cutting. 1. U. S. S. 2. Square.	Bolts. Jack screws. Cap screws. Set screws. Stud screws. Face plates. Back plates. Milling machine arbors. Cross feed screws. Etc.	1. Show by demonstration: (a) How to set up lathe for threading. (b) How to grind and set threading tool. (c) Steps involved in cutting the thread. (d) Use of measuring tools. 2. Reference: Machine Tool Operation, Burghardt. Part I. Chapter X.
4. Chuck work.	1. Ability to do all ordinary chucking operations to within .001" of specified dimensions.	1. Chucks and their uses. (a) History of chucks and their development. (b) Classification of chucks. (c) Care of chucks.	(a) Truing up. (b) Centering. (c) Facing. (d) Drilling. (e) Boring. (f) Taper boring. (g) Eccentric work.	Collars. Bushings. Sleeves. Ring gauges. Gear blanks. Washers. Die stock. Screw driver handle. Etc.	1. Demonstrate: (a) Mounting and removing chucks. (b) How to set jaws true. (c) How to "true up" stock. (d) Centering of stock. (e) Facing ends of stock. (f) Use of drill. (g) Use of boring tool. (h) Use of reamer. 2. Reference: Chucks and Their Uses—Skinner Chuck Co.; Machine Tool Operation. Part I. Chapter VIII.
5. Arbor or mandrel work between centers.	1. Student should be able to do ordinary arbor or mandrel work to within .001" of required dimensions.	1. Lathe arbors or mandrels. (a) Definition and classification of arbors. (b) Methods of forcing arbors into work. (c) Surface plates and their use.		Collars. Bushings. Sleeves. Ring gauges. Gear blanks. Washers. Die stock. Etc.	1. Demonstrate use of arbors and turning operations. 2. Demonstrate use of arbor press. 3. Reference: Machine Tool Operation, Burghardt. Part I. Chapter VII. Page 119 to page 124.
IV. Plain Milling Machine.	1. To be able to mill any type of work the machine is capable of doing to limits specified on blue print or to within at least .001".	1. Construction and use of milling machines. 2. Care of tools, machine and equipment. 3. Analysis of the process of milling. 4. Speeds and feeds of milling cutters. 5. Classes and kinds of milling cutters. 6. Indexing—tools and terms used. 7. Sizing and cutting of spur gears. 8. Lubrication of cutters. 9. Milling jigs and fixtures. 10. Knowledge of working properties of stock. 11. Safety precautions in connection with machine. 12. Related mathematics, science, mechanics, and vocational guidance information.	(a) Plain horizontal milling. (b) Plain indexing. (c) Gear cutting. (d) Slotting. (e) Key seating. (f) Straight fluting. (g) Angular milling.	Riveting hammers. Toolmakers' clamps. Squares. Spur centers. Boring tool holders. Square and hex. bolts. Drill blocks. Wrenches. Parallels. Cutter and reamer shanks. Gears. Clamps. Reamers. Machine parts. Etc., Etc.	1. Demonstrate setting up and operation of machine. (a) Methods of holding and clamping work. (b) Assembling arbor. (c) Necessary adjustments for feed, speed, etc. (d) How to take cuts. (e) Use of micrometer, dials, and measuring work. (f) Use of dividing head. (g) Use of plain and swivel vise. (h) Use of attachments. 2. Make reading assignments on topics. Require oral and written reports on same. 3. References: Advanced Machine Work, Sections 10 and 11—Smith; Treatise on Milling and Milling Machines Cincinnati Milling Machine Co., publishers; Machine Tool Operation, Burghardt. Part II. Chapters VIII to XII, inclusive.

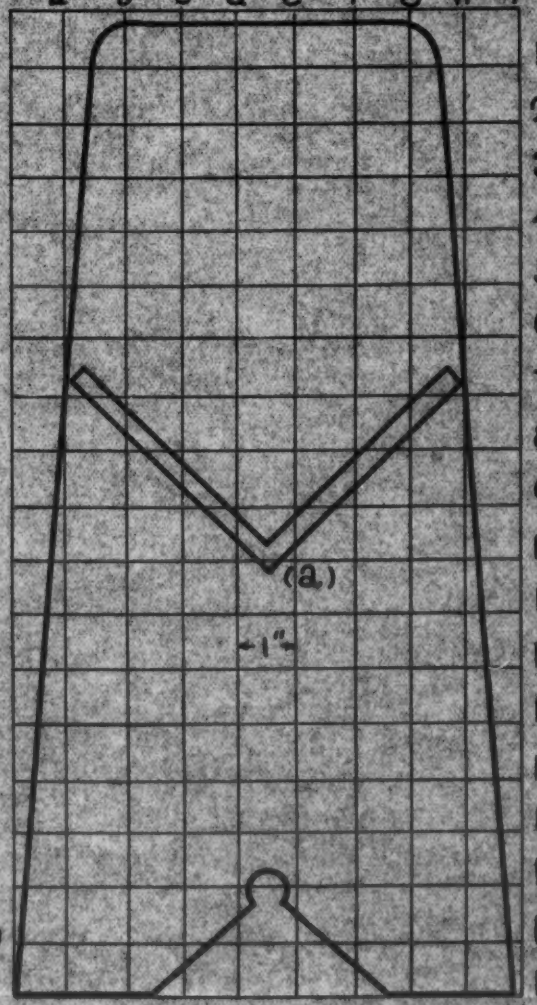
To be interpreted for School Shop Use Only.

PORTABLE BOOK TROUGH
END - DESIGNS



Ends of $\frac{3}{4}$" stock
Trough of $\frac{1}{2}$" stock
Trough tenoned, doweled or fastened with screws to ends
Trough can be solid or open at bottom.
Length of trough optional
Students may develop other designs for end pieces





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Designed by A.E. GRAY

Details of this Portable Book Trough will be found on Page 66, Industrial-Arts Magazine, February, 1936.

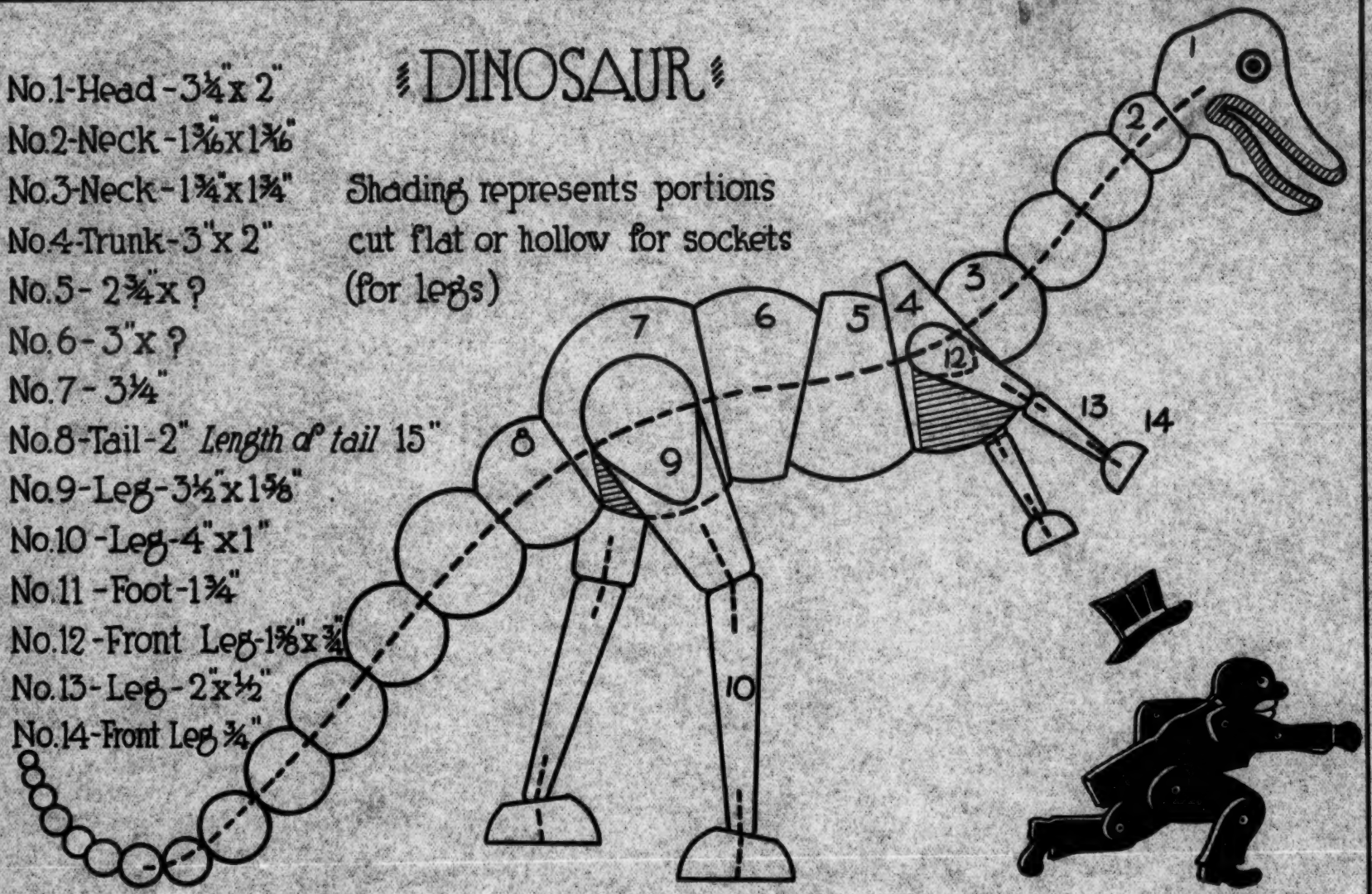
TRACING SUPPLEMENT No. 6.
THE INDUSTRIAL-ARTS MAGAZINE
FEBRUARY, 1926.

To be blueprinted for School Shop Use Only.

DINOSAUR

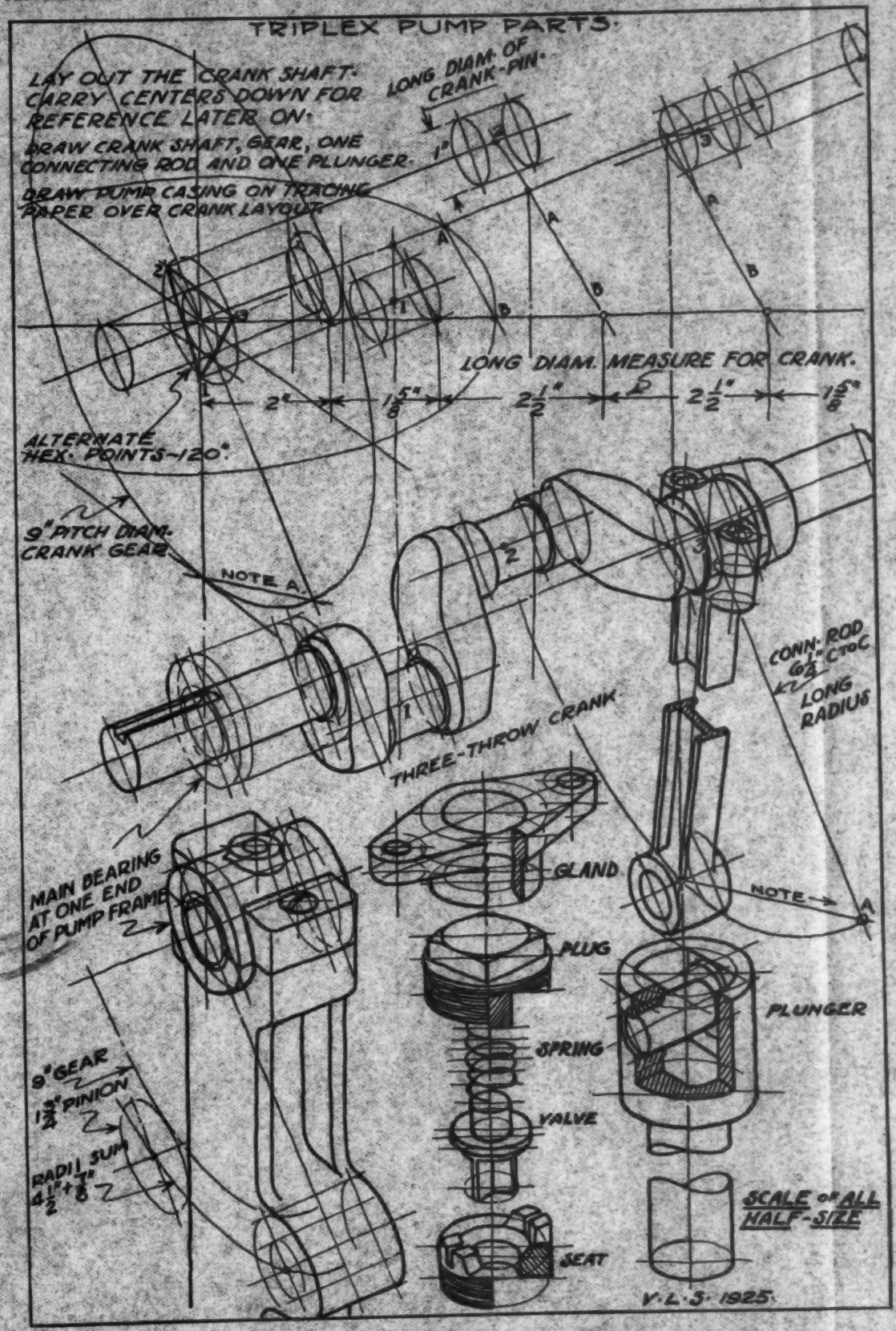
No.1-Head - 3¼" x 2"
No.2-Neck - 1 3/16" x 1 3/16"
No.3-Neck - 1¾" x 1¾"
No.4-Trunk - 3" x 2"
No.5 - 2¾" x ?
No.6 - 3" x ?
No.7 - 3¼"
No.8-Tail - 2" *Length of tail* 15"
No.9-Leg - 3½" x 1⅝"
No.10 - Leg - 4" x 1"
No.11 - Foot - 1¾"
No.12 - Front Leg - 1⅝" x ¾"
No.13 - Leg - 2" x ½"
No.14 - Front Leg ¾"

Shading represents portions cut flat or hollow for sockets (for legs)



Designed by W. I. Tawse, Laurel, Del.

For Details see Page 66, Industrial-Arts Magazine, February, 1926.



A SUGGESTIVE PLATE OF PROBLEMS IN TRUE PERSPECTIVE. Prepared by Prof. V. L. Sherman, Lewis Institute, Chicago, Ill. This is the fifth of a series of six helpful plates for teaching true perspective in a simple, direct manner.

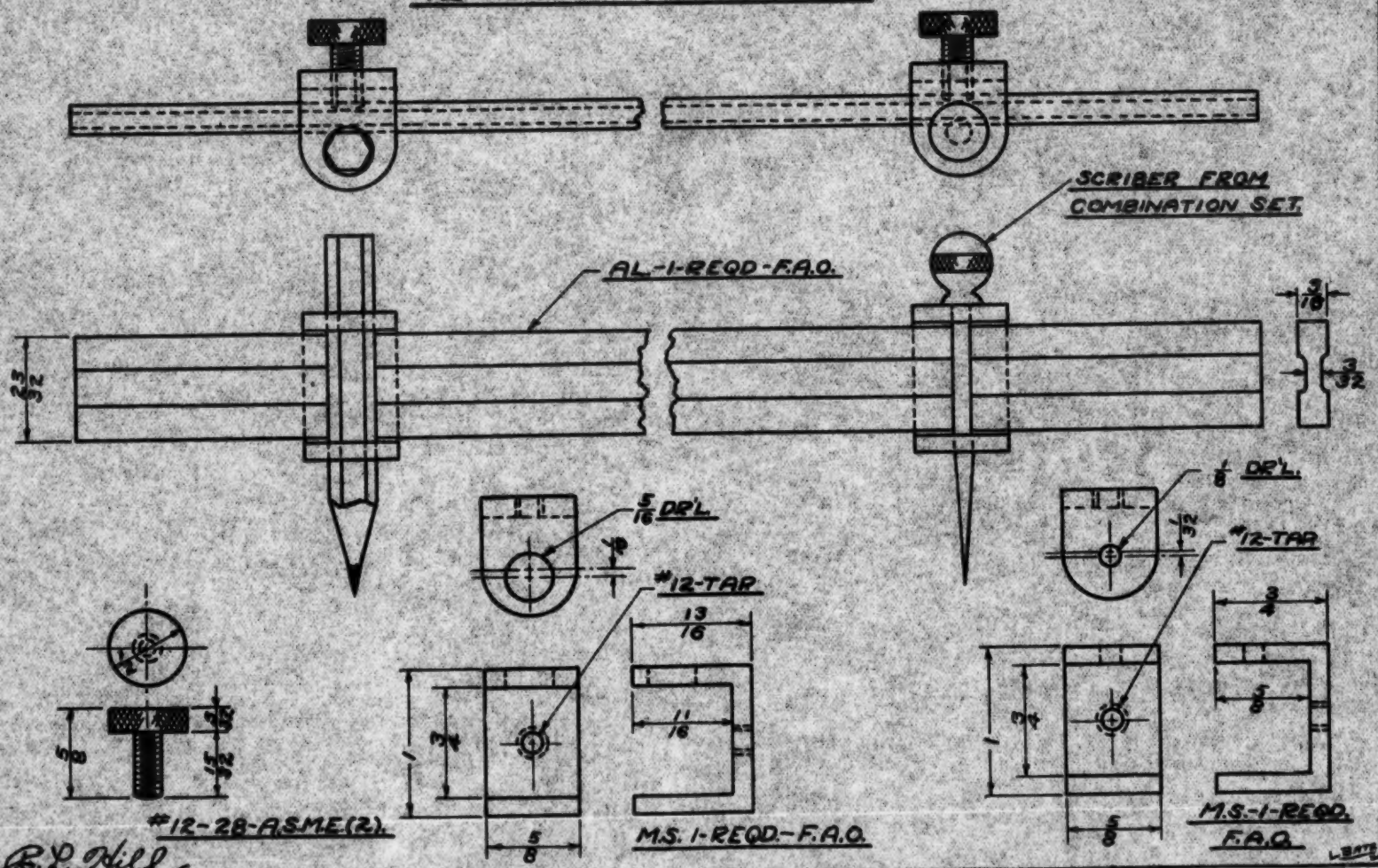
TRACING SUPPLEMENT No. 7

To be blueprinted for School Shop Use Only.

TRACING SUPPLEMENT No. 4.
THE INDUSTRIAL-ARTS MAGAZINE.
FEBRUARY, 1926.

To be blueprinted for School Shop Use Only.

12" BEAM COMPASS



R. L. Hill

Designed by Rowland L. Hill, Saginaw, Mich.

Details of this Beam Compass will be found on Page 68, Industrial-Arts Magazine, February, 1926.

COURSE OF STUDY IN MACHINE SHOP PRACTICE—9B GRADE

Units of Subject Matter.	Specific Aims, Standards, and Objectives.	Teaching Material: Theory and Practice.			Methods and Teaching Devices. (Suggestions to Instructors.)
		Topics for Discussion and Research.	Laboratory Work.		
			Processes.	Projects and Problems.	
V. Universal Grinder.	1. (a) To complete work of a cylindrical or flat type to dimensions within .001 of an inch, micrometer measurement or fitted to gauge. (b) Ability to trim, balance, and dress grinding wheels.	1. Types of grinding machines in use. 2. Names, care, and use of parts of machine, attachments, and tools used. 3. Care of tools and equipment. 4. Shapes and grades of grinding wheels. 5. Grinding allowances and fit allowances. 6. Selection of wheels for grinding. 7. Speeds of work and wheels. 8. Abrasives and processes used in grinding. 9. Glazing and its remedies. 10. Emery wheel dressers. 11. Safety precautions. 12. Related mathematics, science, and mechanics.	(a) Cylindrical grinding. (b) Surface grinding.	Arbors. Lathe centers. Plug and ring gauges. Reamers. Cutters. Parallels. Pencil sharpeners. Etc.	1. Demonstrate operation of grinder. (a) Preliminary adjustments. (b) Setting up and use of attachments. (c) Methods of driving work. (d) Mounting wheels. (e) Truing wheel. (f) Use of graduated scales. (g) How to take cuts. 2. Assign readings on grinding. Require reports. Conduct class discussions. 3. Use illustrative material procured from grinding manufacturers. 4. References: Advanced Machine Work—Smith, Sections 7 and 8; Machine Shop Tools and Methods—Leonard, Chapters XXVIII and XXIX; Machine Tool Operation, Burghardt. Part II. Chapters XV and XVI.
VI. Bench Grinder.	Student should be able to sharpen his own tools to correct cutting angles and to fit gauge when necessary.	1. Safety precautions. 2. Mounting wheels. 3. Care of wheels.	(a) Hand grinding.	Tool bits. Threading tools. Drills. Center punches. Chisels. Scrapers. Scratch awls, etc.	1. Demonstrate: (a) Use of emery wheel dressers. (b) Adjusting of tool rests. (c) How to sharpen tools.
VII. Power Saw.	1. (a) To be able to saw stock of any kind to required length or width to within $\frac{1}{16}$ inch over-size and assist in keeping saw in good working condition. (b) Ability to choose stock the specifications call for.	1. Kinds and types of machines in general use. 2. Selection and speed of saws. 3. Care in handling saws. 4. Additional knowledge of stock-recognition and working properties.	(a) Operation of power saw.	Sawing stock to lengths for use on bench and machines.	1. Demonstrate operation of saw. (a) Use of vise in clamping work. (b) Method of placing saw in frame. (c) Raising and lowering saw. (d) Preliminary adjustments. (e) Use of stop and support. (f) Starting and stopping saw. 2. Reference: Starrett Booklet, "Hack Saws and Their Use."
VIII. Forge.	1. To be able to operate the furnace correctly, do light forging operations to degree of accuracy usually required in this work, and be able to harden and temper steel.	1. Types of furnaces in general use. 2. Names of forge tools used. 3. The anvil and its parts. 4. The measurement of heat. 5. Heat treatment of steel. (a) Hardening. (b) Tempering. (c) Annealing. (d) Case hardening.	(a) Furnaces operation. (b) Light forging.	Center punches. Boring tools. Chisels. Screw drivers.	1. Demonstrate how to operate furnace. (a) Method of lighting. (b) Adjusting for correct mixture. (c) Shutting off. 2. Give demonstration in light forging operations. 3. References: Elementary Forge Practice, Harcourt; Machine Tool Operation, Burghardt. Part I. Chapter XV.
IX. Tool Crib.	1. Ability to do tool crib work efficiently.	1. Names of tools. 2. Care of tools. 3. Care of tool crib. 4. Tool checking.			1. Use tool crib assignment chart so that each student spends the same amount of time in tool crib.

Machine Shop Tools and Shop Practice—Van Dervoort, W. H.
Machinists' Guide—Wm. Rogers.
Advanced Machine Work—Smith.
Twentieth Century Machine Shop Practice—Drake.
Elementary Machine Shop Practice—Palmateer.
Handbook for Apprenticed Machinists—Brown and Sharpe.
Starrett Books for Machinist's Apprentices—L. S. Starrett.
Tool and Die Design for Beginners—Shailor.
Publications of Industrial Press.
Machine Shop Tools and Methods—Leonard.
Tool Making—Kaup-Chamberlain.
Metal Work—Adam-Evans.
Complete Practical Machinist—Joshua Rose.
Elementary Forge Practice—Harcourt.
Shop Mechanics and Mathematics—Johnson.
Metal Cutting Tools—De Leeuw, A. L.
The Working of Steel—Colvin and Juthe.
Mathematics for Machinists—Burnham.
Mechanics for Machinists—Burnham.
Elementary Practical Mechanics—Jameson.
Mechanics of Machinery—Heck.
Principles of Mechanism—James and MacKenzie.

Trade Publications

How to Run a Lathe, Edition No. 25—South Bend Lathe Works.
Chucks and Their Uses—Skinner Chuck Co.
Hack Saws and Their Uses—L. S. Starrett Co.
Hack Saw Facts—Clemson Bros.
The File in History—Henry Disston and Sons.
Disston File Chart—Henry Disston and Sons.
Hack Saw Chart—L. S. Starrett Co.

Automotive Essentials

Lubricating the Engine

Ray F. Kuns, Principal Automotive Trade School, Cincinnati, Ohio

Burned Bearings. In Fig. 1 is presented as evidence, the results which may be expected when lubrication of engine bearings fails. Bearings will give years of service in an engine and still show bright and polished. A few minutes without oil is all that is needed to produce a black, rough surface such as appears in these bearings. Friction is perhaps the greatest enemy of the automobile engine. There are a number of causes of friction. The chief method of removing friction in the moving parts of the engine is to supply them with plenty of oil. It will be seen that if the oil pump, or some part of the oiling system fails, there is extreme likelihood that excessive friction will be set up in the bearings and elsewhere. Only part of the system may fail in which case only part of the bearings may go out. If the entire system fails, for lack of oil, or because of the breaking of some vital link of the system, then all bearings may be damaged. This rarely happens, however. Before all the bearings burn out, as a rule, the engine will stick or

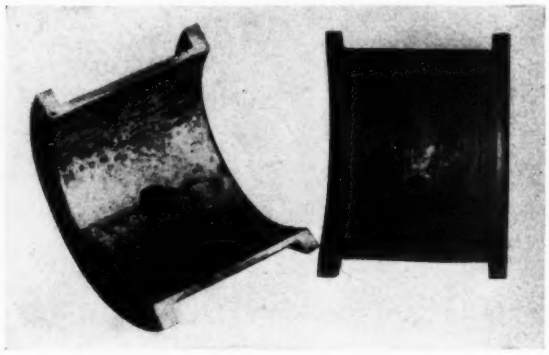


FIG. 1. BEARINGS BURNED DUE TO FAILURE OF OIL SUPPLY.

"freeze". This prevents damage to the bearings, but may result in scored engine parts.

Scored Pistons and Cylinders. The freezing or seizing of the engine from lack of lubrication, if the engine is new and all parts fairly tight, may not result in such serious scores. Scores such as the ones on the piston, shown in Fig. 2, are more likely to occur when only a part of the lubricating system has failed and there is sufficient power developed by the rest of the engine to keep it running. Then the scoring parts are forced more than would be possible if all pistons were sticking. Metal is rubbed from the piston and cylinder walls. This metal wedges between the parts and may be heated, and burned or welded, to either the cylinder or piston and then act as a cutting tool to do further damage. Note the deep scores running the full length of the left-hand piston. These were caused by particles of metal on the cylinder wall. The right-hand piston came from the same used

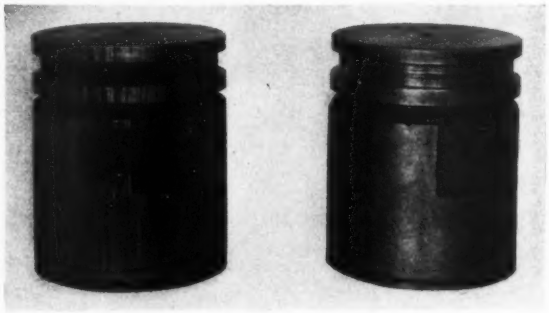


FIG. 2. TWO PISTONS FROM THE SAME ENGINE LEFT ONE IS SCORED DUE TO FAILURE OF OIL SUPPLY.

engine. It is still bright and smooth after many years of service. It is quite evident that the lubricating or oiling system of the engine had only partially failed.

Oil a Lubricant. As mentioned above, it is the purpose, or rather the duty, of the oil to find its way between moving engine parts and prevent undue friction. If the lubricating system places the oil on, and in the vital points, the oil will reduce friction to the safe point. It will not remove all friction, since oil itself offers a degree of friction, but it will prevent the metallic parts rubbing on each other. Instead of the piston rubbing on the surface of the cylinder, it will rub on the film of oil covering the cylinder wall. Instead of the main and connecting rod bearings rubbing on the journals of the shaft they will ride safely on the film of oil which has found its way into the bearing. As a matter of fact an engine which is well designed is equipped with an oiling system, which distributes the oil in such manner and in such quantities that there will be no moving part of the engine in actual metallic contact with any other part of the engine. The film of oil separating the parts may be less than one-thousandth of an inch in thickness but the fact that it is there is all important.

Clean oil is essential. No matter how perfect the oiling system it can not do its work, if the oil is filled with gritty metallic parts, or if it is filled with carbon. Oil will not prevent grit from cutting. The oil passing

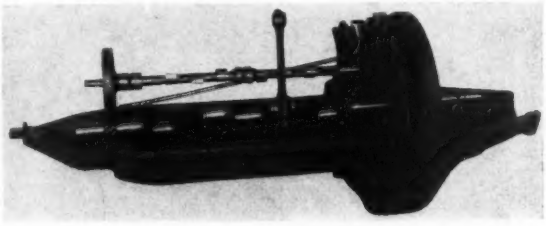


FIG. 3. FORD OILING SYSTEM.

through the lubricating system carries fine particles of dust, grit, or metal with it. Screens are provided in oiling systems but as a matter of fact much of the dirt and grit which does the damage would pass through the finest possible screen. An engine which has had clean oil supplied to it at all times will show a brownish film on the surface of the bearings when they are taken down. This shows that the crank shaft has actually been riding on the oil within the bearing and not upon the metal of the bearing. On the other hand, the engine with bearings too small for the load, or the engine without the proper oil, will show bearings with a brighter appearance when taken down. These bearings may show no signs of scoring or burning, or they may show slight signs. They will show signs of being ground with very fine grinding compound. They show no brownish film. These are the bearings which require frequent taking up. Engines require clean oil, properly circulated. One of the major reasons for trouble in the successful lubrication of an engine is mixing different kinds and grades of oils.

Ford Engine Lubrication. The Ford engine pan, or lower half of the transmission and crank case, has an oil sump. This is the lower part of the magneto and flywheel housing. Oil poured into the engine finds its way to the oil sump. The system used in the Ford engine is the splash and circulating. Oil in the sump is raised from it by the centrifugal action of the turning flywheel. The flywheel, with the magnets mounted on it, carries the oil around with it. A certain amount is thrown up from the sump. The oil thrown upward is caught by the transmission cover and then falls back into the sump. In falling, part of the oil comes into contact with the funnel end of the oil line. Figure 3 shows the approximate position of the crank shaft, cam shaft, engine flywheel and the oil tube of the Ford. It will be noted that the oil tube is placed on the side (right) of the engine where the flywheel is lifting the oil from the sump. The oil tube funnel is set fairly high. The tube runs downward just a short distance and then slopes away to the front of the engine. The funnel is filled by the quantities of oil dropping from the turning flywheel and the oil flows down the tube and pours out on the timing gears in a constant stream.

Of course there is a great surplus of oil. Timing gears require only a little but running in this bath of oil they throw it off, and thus the front main and the front cam shaft bearings receive their supply. After they are thoroughly lubricated the oil still coming down through the tube will start flowing to the rear of the engine filling each trough in turn. Any surplus of oil finds its way into the sump and is again put into circulation by the turning flywheel. In effect the flywheel is a pump. Oil is not forced through the tube but flows from the force of gravity. As long as there is oil in the sump and the engine turns over there is circulation of the oil. Of course, the more oil there is within the engine the more oil will be thrown upward, and more will be caught in the funnel and run to the front of the engine. The oil level, if above the lower petcock, will be high enough to keep the line filled. However, it is not wise to allow the level to become too low, or remain low continuously. On the other hand, if the oil level is too high, there may be a power loss due to the load of churning the extra amount. No good will be done.

It is well for the student to have in mind several facts which are encountered in the Ford system. In going down a long hill the oil will pump into the front end of the engine and remain there until the engine comes onto the level again. The amount of oil which will be held in the front end of the engine will depend on the grade of the hill. This is different from the design in most cars. In most cases there is a sump under the full length of the oil pan. This appears in later illustrations. Oil flowing to the front of the pan will find a passageway into the lower oil level or sump. The greatest difficulty in the Ford is preventing oil pumping under such circumstances. The Ford engine in proper condition will not pump oil even though there may be great excesses of it in the front part of the engine pan. If badly worn, the engine may pump up oil into the cylinders and foul the plugs.

Of more consequence than this is the fact that when traveling up steep hills for long distances, the force of gravity within the oil tube is lessened. When the front end of the car raises, the oil tube is brought nearer a level. It is not at all likely that the car could travel a hill so steep that the oil would not feed forward. On the other hand, the force feeding the oil is lessened, and if all conditions such as quality and quantity are not just right, the engine may be starved. This will result in overheating. It is very essential to have the oil line kept

FIG. 4. FORD CRANK CASE PAN WITH CONNECTING ROD IN POSITION FOR STRIKING OIL IN THE TROUGH.

free of any sediment or other foreign matter such as might come from wearing of the bands, carbon in the oil, or loose band rivets, or other foreign objects. With the oil line clear the oiling system is quite satisfactory and unusually troubleproof.

The circulation of the oil in the Ford engine has been explained. The splash is the other important feature of the system. As stated previously, the oil flowing from the tube at the front of the engine, fills the troughs in the oil pan as it flows along toward the rear of the pan. The pan is provided with four troughs. One trough for each connecting rod. This appears in Fig. 4 illustrating the oil pan as it flows along toward the rear of the pan. The struck by the connecting rods and thrown onto all moving parts of the engine. Pistons, main bearings, valves, cam shafts, bearings, piston pins, piston rings and valve lifters as well as the cylinder walls and cams are thus showered with oil at all times.

The same oil which is used to lubricate the engine also serves to lubricate the transmission, the transmission gears, transmission shaft, triple gears, clutch plates and the bands. The splash from the flywheel throws up a spray which lubricates all of these parts. In all other instances the engine and transmission are separate.

(To be Continued)

INDUSTRIAL-ARTS MAGAZINE

E. J. Lake S. J. Vaughn

Editors

THE TEACHER'S ATTITUDE TOWARD SUPERVISION

The attitude of the teachers of industrial subjects is improving toward supervision and supervisors. Supervision and supervisors are improving, too. The time was when an inspection was resented; when teachers rather suspected that the inspector or supervisor was "snooping around" hunting something to criticize. The kindliest sort of criticizm has often been resented by teachers. And yet, it must be said that sugestion and criticizm have all too often been given in a manner and spirit that provoked resentment.

No sensible supervisor in this day would care to run any unnecessary risk of losing a good teacher. Good teachers are too painfully and awfully scarce. Neither would a wise inspector bring embarrassment to a teacher and unsettle his confidence, and thus lessen his ability to do his work properly. The supervisor is anxious, above all things, for the work over which he has control to be of superior quality. Therefore, it is most important to him that his teachers shall do the very best work of which they are capable. To this end, he is willing to go any lengths to assist the individual teacher to do his best and then to better his best.

One thing a teacher, especially a beginner, should plan to do, and that is to be busy and keep busy about the work in hand while the supervisor is visiting his shop. The supervisor needs no entertaining, no special invitations, no special attention. A sensible supervisor wants to be let pretty well alone while the class is in session. There is no reason for a teacher to be self-conscious and nervous while under inspection. If he is, he always appears at a disadvantage and his work suffers.

A conscientious teacher is always working honestly and at his best. Hence, he has nothing to fear from anyone. Simply a calm assurance and a business-like attitude in the presence of the supervisor or inspector will go a long way toward securing the confidence and respect of such an official.

In the building trades, it is not uncommon to hear a foreman remark that a certain workman "watches the boss" too much. A foreman can tell in a few minutes whether a workman is really on the job or whether he is a loafer. He betrays himself unconsciously. The teacher might sometimes run the risk of being improperly classified as one who "watches the boss" too much.

First of all, it is necessary for every teacher to accept his supervisor or inspector as his friend, to assume that he is looking for opportunities to assist the teacher, and to understand that the success of the work in hand is of common interest and importance to the teacher and supervisor. Both of them depend upon the very same thing for their success and promotion. Hence, there is not the slightest reason and there is not the slightest excuse for friction or injustice between a teacher and a supervisor, if both are competent, honest, fair-minded, and industrious. They are mutually dependent; one cannot succeed without the other.

One of the finest of the fine arts is to take, and to give, constructive criticism kindly and generously. The finest possible piece of professional loyalty is to be able to differ radically in point of theory, and then in practice to yield to the person who has the authority and who thus must bear the responsibility.

THE DIFFICULTY IN TRANSFERRING CREDITS

There is no other one thing in socalled higher education that needs more adjustment and common sense revision than the methods of transferring and rating credits used in the various colleges and universities. There are all sorts of standardizing agencies, the North Central Association of Colleges and Secondary Schools for example. The assumption seems to be generally that to be a member of this or other similar organization carries with it the acceptance by one member of the credits given by another. This, of course, is not the case, since each member considers itself a law unto itself and thus establishes its own particular and sometimes peculiar requirements.

Neither is it true that, for one institution to be fully accredited by another, means that the credits of that institution will be accepted by the other. Registrars, deans, assistant deans, heads of departments, full professors (full in the professional and academic sense of rank) sit with their blue pencils poised and their conditioned blanks ready to pounce upon a simple and unoffending "S" in order to try to reduce it to an "M," or to strike out bodily the grade in "Home Economics" when it should have read "Household Science"!

The student who undertakes to transfer his credits from one institution to another of exactly the same rank, during his undergraduate work, encounters innumerable difficulties, annoying delays, and frequently serious reductions in credits.

Surely the time has come for some sort of understanding among colleges and universities that will make a grade made in one of them a sort of legal tender when presented to another. Now, our transfer difficulties are comparable to the transportation and exchange difficulties on the continent of Europe. May the time speedily come when a student's record in an institution of recognized standing may circulate in American institutions as a gold dollar circulates among American banks.

ART AND ITS APPRECIATION

Art is neither an affectation nor a phantasy. It lies at the very heart of the order and substance of the universe. It is subject to general laws without being able to be learned by rote, or expressed in specific rules of procedure.

A well-known teacher in the middle west a few years ago startled all of his classes in design by requiring the memorizing of what he called "the 22 rules of design." When they had memorized the 22 rules, he thought they were pretty well advanced in art. As the student undertook a practical art project, the teacher would simply say, "Rule number seven" or "Rule number eleven," as the case might be, assuming that the student could immediately follow the rule.

As a matter of fact, everyone knows now, or should know, that art cannot be taught in any such stiff and stupid way. Appreciation must be acquired in a more intimate contact with art itself. Appreciation can never be acquired by simply learning rules. Indeed one may know all the rules and be somewhat familiar with the methods of art procedure, and possibly be able to make some socalled designs, without developing much art appreciation.

Art appreciation is something of an emotional response to what has been put on canvas, woven in tapestry, wrought in metal, or chiseled in stone. It is a reaction that brings joy and satisfaction. A work of art is a work of art to one with a sense of art appreciation, before such an one has analyzed the motive back of it, or the principles underlying it. There is much more than the intellectual appeal, although the intellectual appeal must always be present.

Let it be said again that only a comparatively few people will ever be artists or musicians. Yet, it is vitally important that all people shall be able to appreciate art, music, sculpture, and architecture. They cannot learn all the rules of any one of the fine arts. Neither can they learn to apply the principles and to master the materials and the mechanics of any of the arts. But they can be brought into constant contact with examples of the arts, in such a way as to give them a keen appreciation of them, and a sense of satisfaction and joy in their contemplation.

MAKING HAY

By Laurence Parker

All of us believe there is truth in the old saying, "Make hay while the sun shines." It is given all sorts of applications. Any one who has seen a field of new cut hay with the rain falling upon it can appreciate what an effective illustration of opportunity it is. It is used to encourage thrift, and better still, it is used to encourage the boy and the girl to make the most of the educational advantages offered them.

If we really believed that all boys and girls should make hay (educationally) while the sun shines (or as they have an opportunity), then the whole problem should be very simple indeed. Any smart boy or girl, who is really worth educating, should be easily "sold" upon such a proposition; yet the figures show that millions of boys and girls leave school at the end of the eighth grade and refuse to make further hay. Why is this the case? When a farmer refuses to cut his hay either he thinks his time is of greater value to him at other work—or the hay has no market value. It may be wild hay, for example, and there may be only a market for tame hay.

If there were only a few such cases we would conclude that certain boys and girls were lazy or indifferent, or that a few schools were not offering a type of education which seemed (to the boys and girls) to have a market value. But when the number of boys and girls who refuse schooling runs into the millions we must conclude that the blame should not rest entirely on the boys and girls. We, as educators, should try to see if we are not to blame for much of this "hay-maker's strike" which comes at the end of elementary schooling.

All educators believe that the boys and girls should make hay (educationally) while the sun shines. Everyone in the teaching profession believes this, but there is a difference of opinion as to the method to be used. There is one group of educators who say, in effect, "The sun will shine for a long time. We must teach this boy the history of grass, the history of its harvest in all parts of the country. We must give him an engineering education in order that he may be able to design better hay cutting equipment than has ever been used before. We must teach him some of the foreign languages so that he can make a study of foreign hay in the native literature of the country. We can do all of this and still enable him to get the hay in before the sun goes down." This might be termed the "liberal education" method of making hay. It implies optimism on the part of the teacher and the use of the long days of the arctic regions on the part of the student.

There is another and much smaller group of educators who say, "Teach him the very best way to make hay right now with the existing machinery, and help him over the rough spots in getting in the hay before sun-down. After the crop is in he will have a chance to study the history of grass. After he has operated existing machinery he will be better able to improve upon its design. The most important thing for him is to get in the hay and *do it now*."

The smaller group are advocating the vocational method of getting in the hay. They are able to point to the many boys, and girls too, who under the liberal method of hay making, were caught at sun-down with a good knowledge of the history of grass and a little knowledge of design of hay making machinery, but with little understanding of how to cut and cure actual hay. Because the vocational group has helped boys and girls to get their hay made in a satisfactory way they are getting many converts, from among the employers, the parents and from the ranks of "liberal" hay makers.

The vocational method may seem narrow, but does it not seem to be the sort of safe and sane method of hay making that you would plan for your son and daughter to use?

The Clinic

How the Printing Teacher, as "Doctor," Prescribes for his "Patients" the First Time They Come for "Treatment"

R. A. Loomis, Jersey City, N. J.

"Oh, Doctor, quick, I'm sick; give me something. I can't be sick; I have a job and must work hard to support my family. Can't you do something?"

"Well, sir, what's the matter?"

"Don't know; can't you tell?"

After going through the customary formalities of diagnosis the Doctor came to his conclusion and prescribed the remedy. The patient took the medicine according to the doctor's directions and was made well and put in condition to work. This was a wise patient—he knew he was ill and, better still, had the will power to go to the proper place for treatment.

A physical ailment is not far removed, in its general aspects, from a mental one. To diagnose for either requires sympathy and skill.

Let us now note how a group of young men are "examined" who have come seeking "treatment" for inefficiency in printing. They made a long stride forward when they realized they were below standard, and another step when they came to school to improve themselves. Now let the "Doctor" examine, diagnose, and prescribe.

Questions similar to the following are asked of each "patient" in turn and "prescriptions" given to cure each "case."

The "Doctor" speaking, "Tell me where you work; what you are doing each day; what are the possibilities in your present position, and what kind of work you like to do best?"

A rather thin and nervous-looking fellow replied, "I'm a feeder; can do 2,000 an hour; work on a Gordon. The Boss won't let me make-ready; says I can't. He won't let me touch the cases; afraid I will pi them. Guess I'm done there next week if I don't get a better chance to learn."

The "Doctor" replied, saying, "It seems to me that you should learn to make-ready, first; then after you have become proficient with the presses you should learn the first operations of producing a job of printing; you should learn the case and familiarize yourself with type composition so that you will then be able to help with that part of the work, if the chance should come your way."

"But I'm in a big shop and I must stick to one kind of job," the "patient" explains.

"That will attend to itself," the "Doctor" continues. "You come here and learn make-ready so that you may apply it directly to your daily work on the job which you have. Learn this thoroughly, then get the composition end, and then you will feel independent."

A new comprehending expression appeared on the "patient's" face. He was thinking, hard.

By this time interest in the process of diagnosis and prescription had been aroused and ailments were unhesitatingly given.

"May I ask why you knock at the clinic door?" asks the "Doctor" of a young, rather disheartened boy.

"I work all day putting away leads and sorting pi. I would like to learn the case but as I don't know it, the Boss won't let me try. He says he can't afford to let his men take time showing me."

"Your case is simple," replies the "Doctor"; "I shall give you a thorough dose in straight type composition which will include successively more difficult job work. You may follow each job through the press and back into the cases. I will let you handle all the type you wish."

What more could cure?

Another young man's ailment runs thus: "I make-ready and feed presses all day and I can't see much future in that—only monotony. The automatic feeders are replacing men, anyhow."

"You should learn to set type," diagnoses the "Doc"; "that is more interesting to many people and requires the display of considerable judgment and skill. I can give you interesting and helpful job composition after you have learned the case."

Still another wails thus, "I set type all day, straight matter and job work, but I never get a chance on the presses."

"You may take up stonework as well as presswork and learn that part of the printing business," replies the "Doctor."

"My work is setting ads. They come to me all fixed up ready to set; I am told just what type to use and all about it, and it usually comes out correctly. How do they do it?" troubles this one.

"That is layout work. You can do that as well as anyone after a little training and experience," replies the "Doctor." "You should do very well at this work with your knowledge and experience. I will show you how to make certain numbers of words fit fixed spaces. You can learn to figure what size type to select if you need to have a certain number of words take up a certain number of pages of a certain size. Or, you may find how many pages a certain number of words will make when set in a certain point size of type in a given width of line. This is very interesting work and develops ideas and gives chances for expression of originality of arrangements of type borders and ornaments. The field for this work is practically unbounded. It is the work that develops the ordinary printer into the foreman or advertising man. More brain work commands more pay. The way is clear for you."

"Let me call to your attention right here," said the "Doctor," "to a branch of the printing industry that is growing rapidly but will never entirely supplant hand work in the shop—that is, machine composition. The line and letter casting machines make possible the large amount of reading matter of today. The most proficient operator is one who has come up through the experiences of hand composition. Learn to set type by hand and then go learn the machine, if you wish. By so doing, you will understand general type arrangement better no matter at what you work."

Next is the young boy-of-all-work-about-the-shop, speaking, "I'm the 'Devil' and they won't let me do nuthin' but hike down the street with bundles and when I get back I sweep out the shop."

"If you will learn to feed a press here you can surprise the Boss some day with what you know," the "Doctor" consoles him.

The following came from an "old-timer." "The Boss was stuck and so was I today with the job he got. He does not know much about printing. He has always been a solicitor. We have a 64-page book job and I must engineer the thing through. I am the foreman. How about a few pointers on imposition?"

"Yes," answered the "Doctor." "You may take up dummies and layout blank pages just for practice. You may figure your margins and folding. You get these

ideas firmly fixed in your mind, here, where you may calmly do your work, without hurrying or using your employer's time, and you will be all right."

The "Doc" made a bull's eye that time.

The next young man's trouble was with ink. "Tell me, how do you get purple or green ink when you don't have them already mixed from the ink maker?"

The "Doctor" replies confidently, "You must have been printing colors today. You may practice that work here, too, and learn without wasting the ink where you work. The correct way to mix inks to get certain colors is simple."

The history of printing is wanted by another patient: "I have heard the name of Gutenberg spoken of in regard to early printing and I never had the nerve to ask about the man."

"You are looking for the history of your art," says the "Doctor." "That is a good symptom. There are so many things to be said about the history of printing that now and then to vary our work through the term, we are going to take time to talk about early printers and to study their work. Besides the history of the early printers you will be told of the methods of manufacturing electrotypes, stereotypes, halftones, ink, paper, and type and numerous other allied industries. You will also be given a chance to talk about the work you do so that all may be benefited by what each knows."

Another young man's weakness concerned paper. "I put the jobs on the press and I am expected to attend to the cutting of the paper, too. Today I had a run of 5,000 odd size cards to print, 3¾"x6¼". I cut up a couple hundred sheets of stock and set the counter on the machine and told the feeder to go ahead; but there were too few so I cut up another hundred sheets and told him to go ahead and then too many were printed. Can you tell me how to figure out that job, right?"

The "Doctor" is not perturbed by this, he explains. "I will show you how to figure the cutting of your paper with more simple figures. Then, when you get the idea, you will just have to watch your figures and you will not make mistakes nor waste paper stock."

The following last patient must have placed himself thus, because he "ailed" all over; printorially speaking, he knew nothing at all. He presented a blank slate.

"You," announces the "Doctor," "require nourishment in every tissue. You must begin at the beginning and just learn, I am glad that you will let me take you and do what I should by you. I will proceed with the following doses in natural order: composition, proofing, presswork, distribution; when you have taken all these preparations and they have taken effect you should be cured."

From the foregoing questions and answers, which are typical of evening-school and continuation-school applicants in printing, several conclusions may be drawn. Principal among them is that when he is ailing, he generally knows it and also in what respect, and, if he is normally intelligent, he looks for help. Another fact must be recognized and that is, that all who come to the "clinic" are not ailing the same way. Each case requires special treatment. No prescribed method or procedure of work can be given to all alike, or at the same time. To put it in the vernacular, each "wants what he wants when he wants it." The "Doctor" recognizes all these peculiarities and proceeds accordingly. He should have, however, in the background, a set course of work or "treatment" which will round out a competent workman from educational and trade standpoints.

A USEFUL ALPHABET BY W. BEN HUNT AND ED. HUNT.

Carpentry in the High School

B. A. Knight, Greencastle, Ind.

The purpose of this article is to show the practical nature of manual arts and how it may be made to function in the community.

Architectural drawing has been taught in the Greencastle High School for the past several years as a popular subject; not only in designing houses as required classwork, much of it on a commercial basis, but in helping patrons of the school to design and plan houses.

This is the first year a house has been designed and built by the classes. The movement had its origin as a part of a home complete movement started by the writer, who gave talks before the local rotary club, kiwanis club, parent-teachers' club and discussed it with the superintendent and school board. The proposition was thus sold to the public. It was soon put on foot, the school officials got behind it, a party furnished the site and materials, plans were drawn for a seven-room house with bath and breakfast nook, and work was started.

HOME BUILT BY HIGH SCHOOL STUDENTS AT GREENCASTLE, IND., UNDER THE DIRECTION OF MR. B. A. KNIGHT.

The whole scheme was educational, being built on school time. Much publicity was given to the project in the daily press, not only prior to its beginning, but as the building progressed. A perspective, the floor plans, and elevations were displayed in a local bank and store windows.

The house was thoroughly analyzed in class. All operations discussed in class, the time element for each operation discussed, and each step evaluated, working to an advantage. Each student handed in a charted, analyzed sheet prior to actual work, the purpose of which was to psychologically think "house" and to summarize or rather "feel" the problem.

Group leaders were chosen who had certain portions of the work for which they were responsible. As the work progressed, others were given a chance to try out as leaders.

Daily the superintendent of schools photographed the progress of each day's work from an established stake set for his camera. His work was to be official photographer.

The manual training classes built the house, the domestic science classes made curtains and furnishings, and the art department looked after the color schemes in wall decorations.

When the house was enclosed, the manual training classes were given an opportunity at wiring the house, put in the plumbing and the furnace. Each member of the group chose which he preferred, thus giving the general shop idea a chance to function.

The manual training classes chose rooms and made the furniture to suit the same, which made a practical exhibit.

One of the local banks offered a prize for the best designed small home suitable for the Northwood addition, a beautiful new suburb of Greencastle. This was an incentive for the architectural drawing classes; all drawings were exhibited at the time of the opening and judged by competent local architects.

The day was set for the opening of the model house. On the opening night, speeches were made by prominent members of the town, light refreshments were served by the local kiwanis and rotary clubs, and the superintendent of schools formally handed the key to the lady who had made it possible by furnishing the site and funds for the materials used.

Invitations bearing the perspective view of the house were sent to each school superintendent in the state. Twenty-five hundred visitors viewed the model house—"The Home the School Built."

A TEACHING DEVICE FOR MECHANICAL DRAWING CLASSES

F. D. Slater, Rochester, N. Y.

The accompanying questionnaire has been prepared primarily as a teaching device. It aims to present to the new drafting student a series of questions and statements for challenging his judgment, and to give the instructor an opportunity to discuss with the students some of the statements in detail, and impress upon their minds excellence in drawing depends to some extent upon a knowledge of other subjects in the curriculum. The list has been successfully used in the beginners' classes following the reading of the preliminary drafting instructions.

In using the device in the classroom, it is suggested that advanced students proceed with the lettering assignments while the beginners study and discuss the questionnaire.

Mechanical Drawing Right-Wrong Questionnaire
(Make an R or a W after each statement)

1. The successful student must develop the ability to concentrate..... ☐
2. In mechanical drawing, ACCURACY is far more important than speed..... ☐
3. The appearance of a drawing affects its usefulness ..... ☐
4. The T-square must form right angles..... ☐
5. Mathematical ability is of little use in the making of mechanical drawings..... ☐
6. A good drawing board is made of hardwood..... ☐
7. The light should come from the right and front for right-handed students..... ☐
8. Poorly constructed drawing instruments are worthless ..... ☐
9. Good thumbtacks may be easily removed with the thumb and finger nails..... ☐
10. Only the upper edge of the T-square should be used for accurate work..... ☐

11. A 3B drawing pencil is harder than a 5H drawing pencil ..... ☐
12. Modern foreign languages are not studied in engineering schools..... ☐
13. Mechanical drawing has no connection with science ..... ☐
14. The 45-degree triangle has legs of equal length. ☐
15. India ink is held in the ruling pen by capillary attraction ..... ☐
16. The hypotenuse of the 30-60 degree triangle is twice the length of the short leg..... ☐
17. The student who wastes time gets the highest marks ..... ☐
18. Improperly worded notes on mechanical drawings may convey an opposite meaning..... ☐
19. The pencil and ink legs of the compass should be equal in length to the needle leg..... ☐
20. The protractor is sometimes used to measure the diameters of angles..... ☐
21. Dampness may cause a drawing board to warp.. ☐
22. It is good practice to use two drawing pencils, each one having a different style point..... ☐
23. Preliminary sketching and planning aids one in making nice drawings..... ☐
24. The scale should be used as a straight edge.... ☐
25. A knowledge of Latin derivatives helps the engineer ..... ☐
26. A chisel-pointed pencil lasts longer than a conical-pointed one for fine construction lines.. ☐
27. Anyone has the ability to become an artist..... ☐
28. All good triangles are manufactured of transparent material..... ☐
29. A common medium pencil is better than a hard drawing pencil for preliminary sketches..... ☐
30. Drafting pens may be sharpened on an oil stone ☐
31. It is not important that the drafting student have clean hands..... ☐
32. The French curve is used for drawing smooth curves through plotted points..... ☐
33. Both sides of drawing paper are the same..... ☐
34. The dividers are used for drawing circles..... ☐
35. The drafting student should frequently change the focus of his eyes..... ☐
36. All drafting work cannot be executed efficiently while the student remains comfortably seated. ☐
37. The bow pencil is used for drawing circles having a radius less than seven-eighths inch..... ☐
38. Drawing ink mixes well with writing ink..... ☐
39. Students may learn to appreciate technical work through the study of history..... ☐
40. Mechanical drawing may teach one to become more accurate, careful, thoughtful, industrious, self-reliant, appreciative, and efficient..... ☐

NOW, ARE THERE ANY QUESTIONS?

ANONYMOUS LETTERS AGAIN

The Editors of the Industrial Arts Magazine can take no notice of anonymous letters, whether these are directed to the Questions and Answers Column, or for discussion in the news or editorial columns. The writer of an anonymous letter inevitably puts himself under suspicion of having ulterior motives in writing.

Letters which contain the full signature of the writers are considered confidential, unless it is clear that the writer is willing to have his identity disclosed.

When to Shellac

558. Q: Is it advisable to apply shellac before or after staining?—J. M. W.

A: We find that such treatment over the dried and unsanded water stain results in a much clearer finish for the following reasons:

First, by using stock shellac, reduced with three parts of denatured alcohol, a slight orange tint produced considerably livens the whole tone, and when dried hard, enables the operator to sand to a glass-smooth surface through the use of a split 6-0 paper. The filler may then be applied and wiped much more cleanly, and with greater ease, than is otherwise possible. On porous woods like walnut and mahogany, we frequently find it desirable to recoat the filler with the same shellac after the filler coat has dried not less than 48 hours in a warm room. When the shellac is again dried and resanded, it may be wiped off with a tacky cloth, previous to varnishing, resulting in a surprising plumpness and depth to the first coat of varnish, which when dry, may also be sanded with a split 6-0 paper. A second coat of varnish should be applied full body, dried five days or more, and then water or oil-rubbed as may seem most desirable.

Of late, we have found that, by using turpentine asphaltum varnish, reduced with a liquid made from equal parts of turpentine and gasoline, that considerable depth of tone and color may be obtained by applying over the dried water stain coat. This may be dried thoroughly, and when hard, sanded as for shellac. It is suggested that you try these two methods on sample pieces of stock, in order that it may be judged which will best meet your personal needs.—R. G. Waring.

Architectural Drawings for Newspaper and Magazine Reproduction

Q: We have blue print plans of our new high school building, which is just being erected, and would like to have them put in condensed form so that we can publish them in a local paper. How can we have the work done? —J. E.

A: The building plans published in newspapers and magazines are usually outline drawings showing only walls, windows, doors, stairs, and such details as are essential for an understanding of the general layout of a building. In the case of school buildings it is customary to letter in the names of the rooms so as to designate their uses and to give such special details as are essential to an understanding of the location of furniture, heating and ventilation apparatus, plumbing fixtures, etc. As a rule the scale is $\frac{1}{32}$" to $\frac{1}{16}$" and the lettering is from ¼" to ¾", depending upon the reduction which is to be made in the printing plates.

The making of drawings such as you require will be an excellent job for an advanced student in mechanical drawing. He can work at ⅛" and enlarge his lettering to ¾".

In architects and newspaper offices the work is done according to one of the following methods:

1. The draftsman can make a small scale drawing by actually working at $\frac{1}{16}$" scale. This is rather laborious and takes considerable time.

2. It is easy to draw directly over the blue prints, omitting all small details and making the necessary lettering very large (as much as ½" to ¾" high). When the drawing has been completed with India ink, the blue print is bleached with acid so that only the black India ink lines remain and the background of blue is entirely removed.

3. Another method is very similar to that in No. 2. It consists of printing a set of black prints on "negative" Van Dyke paper and then making a positive print or reversed Van Dyke. This reversed Van Dyke will show the plans with black lines on a white background. These lines are gone over, omitting such small detail as is not wanted. If the drawings have been inked in, the print is bleached to remove unnecessary small details. This is a more economical method than No. 2 and gives better results in general.

4. Small photostats can be made from the original tracings or from the blue prints, and these can be gone over with India Ink, omitting the small and unnecessary details. The photostats can also be bleached to remove the unnecessary details. This method is used quite frequently and saves a great deal of time. It is most economical.

5. Some architects make small photostats and then trace over them on tracing cloth. This is also a satisfactory and economical method, and gives very clean results.

Students Take Industrial Inspection Trip. An industrial inspection trip was recently made by 275 boys and girls from Nixon, Tex., and surrounding schools to business and manufacturing establishments at San Antonio, Tex. The students visited experimental farms, creameries, foundries, shops, mills and other commercial establishments under the direction of demonstration agents, school and chamber of commerce officials.

PROBLEMS & PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

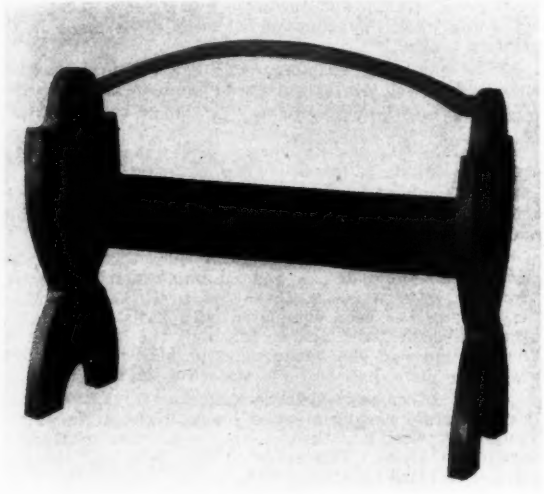
Problems in benchwork, machine shop practice, turning, pattern-making, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration.

PORTABLE BOOK TROUGH

A. E. Gray, Stockbridge, Mass.

(See Supplement No. 5)

The portable book trough, illustrated in the accompanying photograph and drawing, is an admirable woodworking project for junior or senior high school students. It allows great variation and originality in its design. Two suggestive designs for the ends are shown in the drawing. There may be a handle proper, or places cut into the ends for handles. The trough is less difficult if not made solid or closed, but left open, as it allows a little manipulation in clamping to insure trueness when assembled.



PORTABLE BOOK TROUGH.

For younger students, cypress makes excellent material for construction, as it works easily, is strong and offers a variety of choices in the finish. Mahogany, oak, or some of the better cabinet woods are preferable for senior high school classes.

The project differs from the older projects commonly used and is useful, as it provides a place for books, which may be carried to the fireplace or to the porch or shady nook in the yard in the summer.

If time permits, inlay or carving adds to the appearance of the project.

A DINOSAUR (Tyrannosaurus)

W. I. Tawes, Laurel, Del.

(See Tracing Supplement No. 6)

Instructors who desire to teach their pupils the various cuts involved in spindle turning and, at the same time, want the work to be productive, a project, rather than mere exercises (an exercise, the very sound of it, is distasteful to the live boy) will find the dinosaur—yes, we dug him up from beneath many feet of hard mental strata—explained here, an excellent medium. All the fundamental cuts of wood-turning are involved in cutting the various members of this animal.

Head—Center upon lathe a piece of white pine stock about 18" long and 3" square. Turn to cylinder shape 3¾" d. Start from one end and size a portion 3½" long and 2" d. This is for the head. The jaws can be shaped a little while on the lathe, but the greater portion should be shaped with a jackknife.

Trunk—Upon the same stock used for the head, cut with a skew chisel spheres of the following sizes: 3¼" d. (No. 7); 3" (No. 6); 3" (No. 4); 2¾" (No. 5). Caution: Do not cut down too deep when turning spheres for the stock will break in two and spoil the work. Leave about ¾". Notice that each piece of animal's trunk is cut on the eccentric or wedge shape. This is done to give it poise and make many positions possible. Care must be taken when cutting sockets for legs in members No. 4 and No. 7. The upper joint of the leg should fit snugly and at the same time be free to move.

Tail—A piece of stock of heavier material than white pine is better for this purpose. It will make the animal easier to balance. The stock should be long enough to cut the entire tail. After roughing the corners off, taper the stock before turning the spheres. Spheres should be cut a little on the eccentric so that tail can be shaped in any position. The last three joints in the tail may be turned in one piece if desired.

Legs—Cut the legs as drawing shows. The portion, of the upper joint of hind legs, next to No. 7, is left cylindrical, but the opposite side is tapered down to form a joint with hip member. This is not necessary but makes the animal look less clumsy. The tapering on the front legs is done on the side next to the socket of No. 4. This causes the front legs to spread a little from the body. Notice that the ends of the leg joints are not cut square across. The feet are hemispheres with the top—or poles—cut off at an angle with the base—or equator.

Each part should be sanded smooth and painted before assembling. Two or more colors should be used. No skill is required in painting the parts, for a mottled effect is desirable. String the parts together with a rubber cord about ⅛" d. If this cannot be obtained, use four thicknesses of regular rubber tubing, which can be purchased from any first class millinery or from a mail order house. Wire can be used with some success.

A good way to fasten the rubber cord is to insert it in a hole and wedge it tightly with a wedge or plug. Glue can be used to keep the wedge from pulling out. If one of the holes for the rubber cord in the leg joints is bored at an angle, so as to come through the leg about one inch down the side, the rubber can be pulled through this hole and wedged from the outside.

This Dinosaur is taken from a museum catalog. Other ideas similar to the one given in this article can be found on page 79 of the December, 1925, issue of the *Ladies' Home Journal*.

AN UNUSUAL CHISEL-AND-GOUGE-PRACTICE PROJECT

L. F. Hyatt, McKinley High School, Canton, Ohio

Possibly no phase of shop work is of greater importance in the woodworking course than chisel practice, for certainly the development of muscular control is not to be neglected. In spite of this fact, many shop courses are to be found without a single project emphasizing chisel practice. Very few textbooks include projects of this type.

This project, "The Automatic Match Box," if the workmanship is well executed, has the advantage of working perfectly mechanically. The student invariably

strives for mechanical perfection if the project is to perform some particular purpose. By lifting the knob which raises the tongue, one match is automatically deposited in the little trough at the top.

Figure 1 shows a view of the rear and one end. In the base at the left is a place to put the matches that have been lighted. This recess should be equipped with a copper or brass box.

Any straight - grained wood such as oak, walnut, or mahogany is suitable for this project. First, piece A is cut to size and the outline is drawn as shown, after which the chiseling may be begun. This work requires exceptional care as carelessness will not only mar its appearance but may result in such mechanical imperfection that it will not work at all.

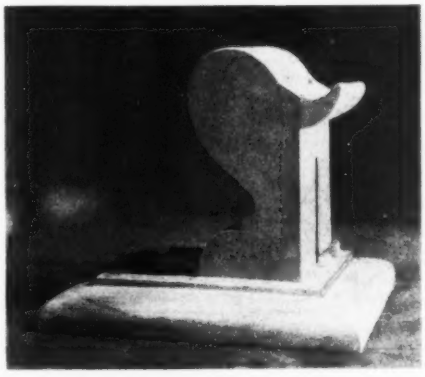


FIG. 1. AUTOMATIC MATCH BOX.

The tongue and back are then made. When it is necessary to plane these pieces by hand they may be held securely by placing a piece of paper between them and a block of wood, this making it possible to separate them after they have been cut to thickness. This method is used invariably by wood carvers when working on small pieces.

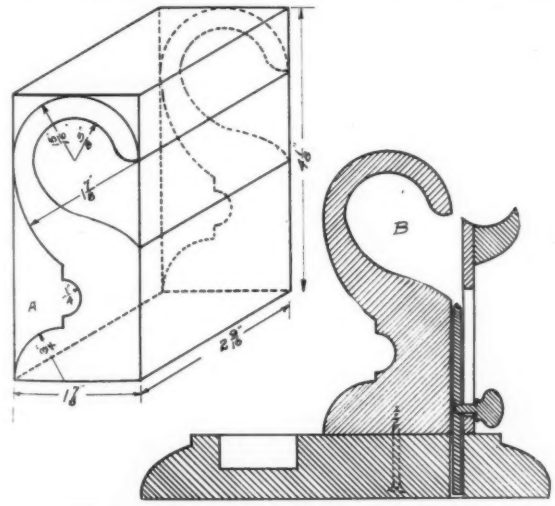


FIG. 2. DETAILS OF AUTOMATIC MATCH BOX.

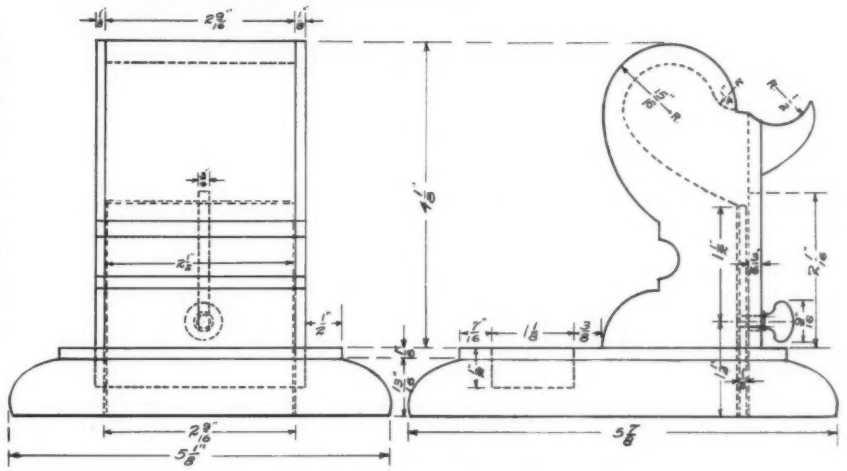


FIG. 3. DETAILS OF AUTOMATIC MATCH BOX.

The base is then made according to dimensions in Fig. 3, using a chisel to shape it. This requires a tool that has a perfect cutting edge. The knob is made and the slot cut in the back to allow a free movement of the tongue. The gluing is very important. A thin piece of cardboard is cut and placed on either side of the tongue to provide the necessary clearance. After this has been done the hole for the knob is bored, being careful to place it accurately.

B, Fig. 2, shows a cross section of all the parts assembled. This will aid the student in visualizing the work he is doing. Place a small clamp on the work to hold it together before gluing the ends on, being sure that the tongue has sufficient clearance in width as well as thickness. Glue size the end grain and allow it to dry, then glue it again, but do not allow any glue to get on the inside. If the tongue is well oiled it may be the means of avoiding trouble when gluing up the project. After it is well dried trim the ends off flush and sandpaper well. It is much easier to glue the ends on without cutting them to shape at all. The work is then filled and varnished or shellacked, as the student may wish.

SHORT CUT

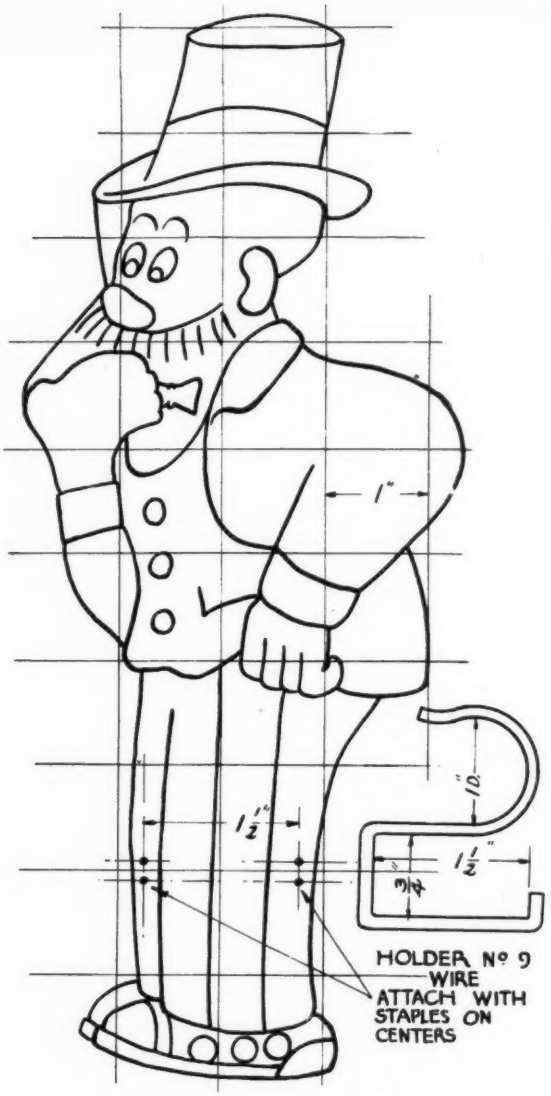
J. A. Miller, New Kensington, Pa.

Any short method which is useful in minimizing mental calculations and can be readily remembered is worth trying.

It is often necessary to divide a fraction by two or four. The draftsman, machinist, and patternmaker must frequently, when diameters are given, reduce the figure by one-half to obtain the radius. This becomes laborious, especially when a great many circles appear on the drawing. Of course, it is easy to take one-half of fractions such as 2½, 4⅛, etc., but when the whole number is odd, it takes much longer.

A sure method of doing this quickly and accurately is to take one-half of the whole number, forget the remainder, then add the numerator and denominator of the fraction to obtain the new numerator, then multiply the denominator by two to find the denominator of the required fraction.

For example: To find one-half of 17$\frac{7}{8}$ quickly. One-half of 17 is 8. Forget about the ½ remaining. 16 plus 7 are 23—the new numerator—23/. Two times 16 is 32—the new denominator. Therefore ½ of 17$\frac{7}{8}$ is 8$\frac{23}{32}$.



DESIGN FOR A BROOM HOLDER.

A great deal of time is saved by using this method in making all kinds of calculations, finding radii when diameters are given, etc. It is surprising how quickly this can be done mentally after a very little practice. If it should be desired to take one-fourth of a number simply repeat the operation a second time.

BROOM HOLDER

Chris. N. Scott, Creston, Iowa

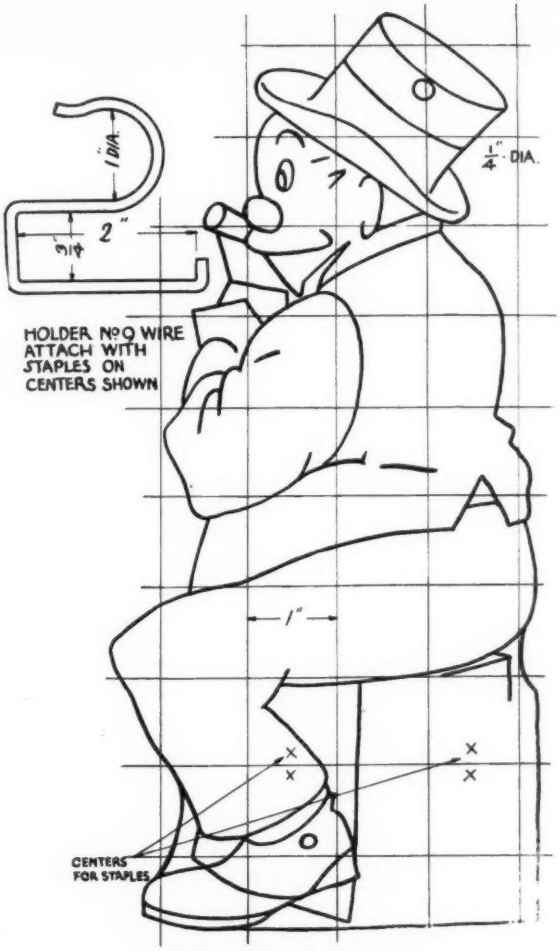
The broom holders shown were designed to capitalize the pupils' interest in the current comic strips of our daily newspapers.

The figures are cut from ¼" stock. The lines may be cut either with a chip-carver or with a veining-tool. The holder is formed from 6½" of No. 9 galvanized wire and is attached to the figure with a staple at each end.

The figures are best finished with show card colors, which dry quickly. The colors are fixed and given an enamel-like gloss with a thin coat of white shellac.

Comic strip characters can also be for match boxes, tie holders and other similar projects.

Apologies are offered to Geo. McManus and Bud Fisher, owners of the copyrighted originals of these figures. It may be well to note that these holders may not be reproduced for commercial purposes.



DESIGN FOR A BROOM HOLDER.

BEAM COMPASS

Rowland L. Hill, Saginaw, Mich.

(See Tracing Supplement No. 8)

This beam compass involves the following operations:

Beam—Shaper work.

Clamps—Forging from flat stock.
Milling from bar stock.
Drilling and taping.

Scribe—Lathe work and knurling.

Screws—Lathe, threading, and knurling.

The clamps should be nickel plated to prevent rust. Other beams may be made for greater radii.

Bill of Materials

1—Aluminum bar, $\frac{1}{8}$"x$\frac{13}{16}$"x12".
2—Steel clamps, $\frac{1}{8}$"x$\frac{5}{16}$"x1½" to be forged into "U" shape, or $\frac{5}{8}$"x$\frac{3}{4}$"x1" to be milled.
2—No. 12-28 A. S. M. E. special screws or any other standard screw for which a tap is available.
1—Steel scriber from a combination set, or can be made from ⅜" diameter x 2" steel bar.

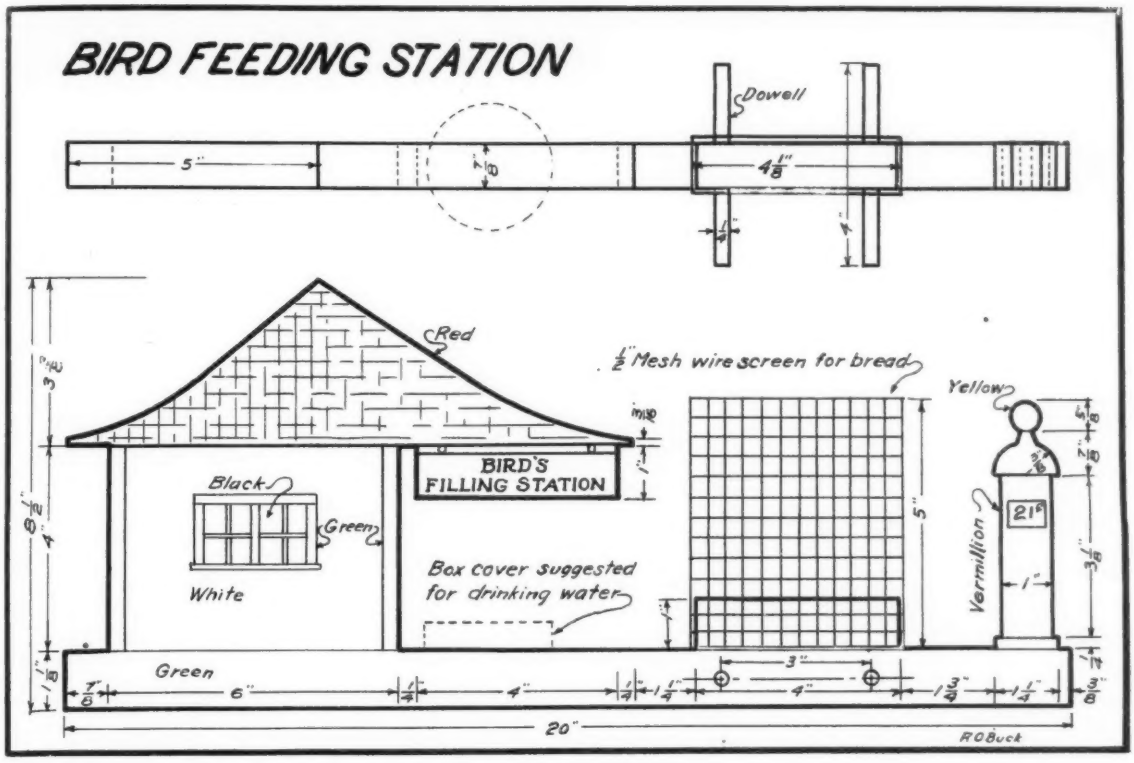
BIRD FEEDING STATION

R. O. Buck, Chicago, Ill.

"The North wind doth blow and we shall have snow: and what will poor Robin do then?"—Nursery rhyme.

The bird feeding station shown in the accompanying drawing makes a great appeal to seventh and eighth grade manual training students because it is unique, attractive, and because anything pertaining to birds is popular with the boys and girls of today.

The station is made out of a single board seven-eighths of an inch thick, eight and one-half inches wide, and twenty inches long, cut to the shape shown by the heavy black lines. A band saw, or even a turning saw, if the former is not available, should be used to cut the



DETAILS OF BIRD FEEDING STATION.

stock. Two one-fourth inch dowel rods four inches long are driven through the holes located as shown, for perches. A piece of half-inch mesh wire screen is bent into a rectangular tube to fit over the raised portion to form the basket into which a slice of bread can be slipped.

The attractiveness of the project depends largely on the painting; bright colors should be used and care taken that they are applied neatly. The colors suggested for the various parts are indicated on the drawing.

If a water pan is desired it may be easily added to the project by fastening a toy pan or box cover to the top edge as indicated. Wire staples, or metal hooks, bent over the edges, should be used to fasten the pan in place.

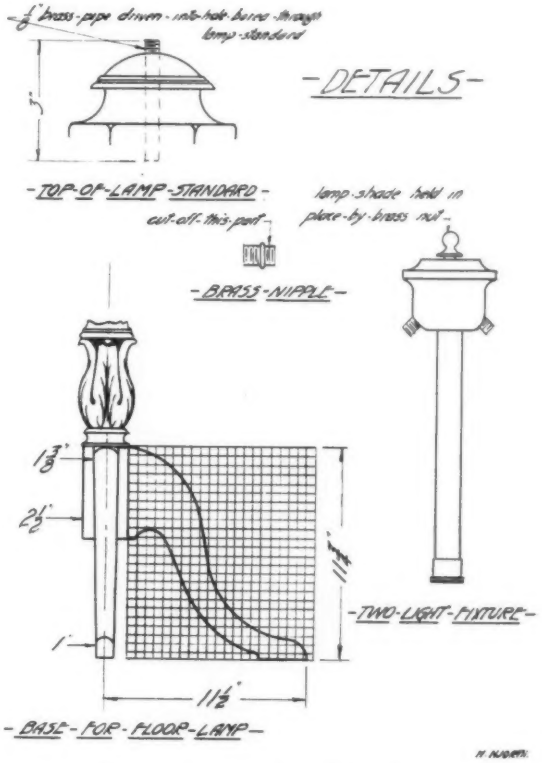
The feeding station may be mounted in any convenient way, though a pleasing method is to drill a hole at the center of gravity, vertically, and nail or screw the project to a post as you would a weather vane. As it rotates in the direction of the wind the wind strain will be greatly reduced.

A full-size pattern of the project should be made on heavy cardboard so that the pupil can trace the outline. The simplicity of the feeding station, as well as its attractiveness and usefulness, make it an excellent project for the grammar-grade student.

A FLOOR LAMP

Herman Hjorth, New York, N. Y.

The design for the floor lamp, Fig. 4, was suggested from an old fire screen. The stem, or upright, is made of two parts, the upper one with the greatest diameter 1⅝", and the lower one with the greatest diameter 3¾". As the wires have to pass through these two pieces, and as it is impossible to bore a hole through such long pieces without special equipment, it is necessary to cut them in two lengthwise and cut a recess in each half, so that a square hole will be formed when the halves are again glued together (see section A, Fig. 4). If the cutting, jointing and gluing are carefully done, it is almost impossible to discover the joint when the lamp standard is finished.



FIGS. 1, 2, 3. DETAILS OF FLOOR LAMP.

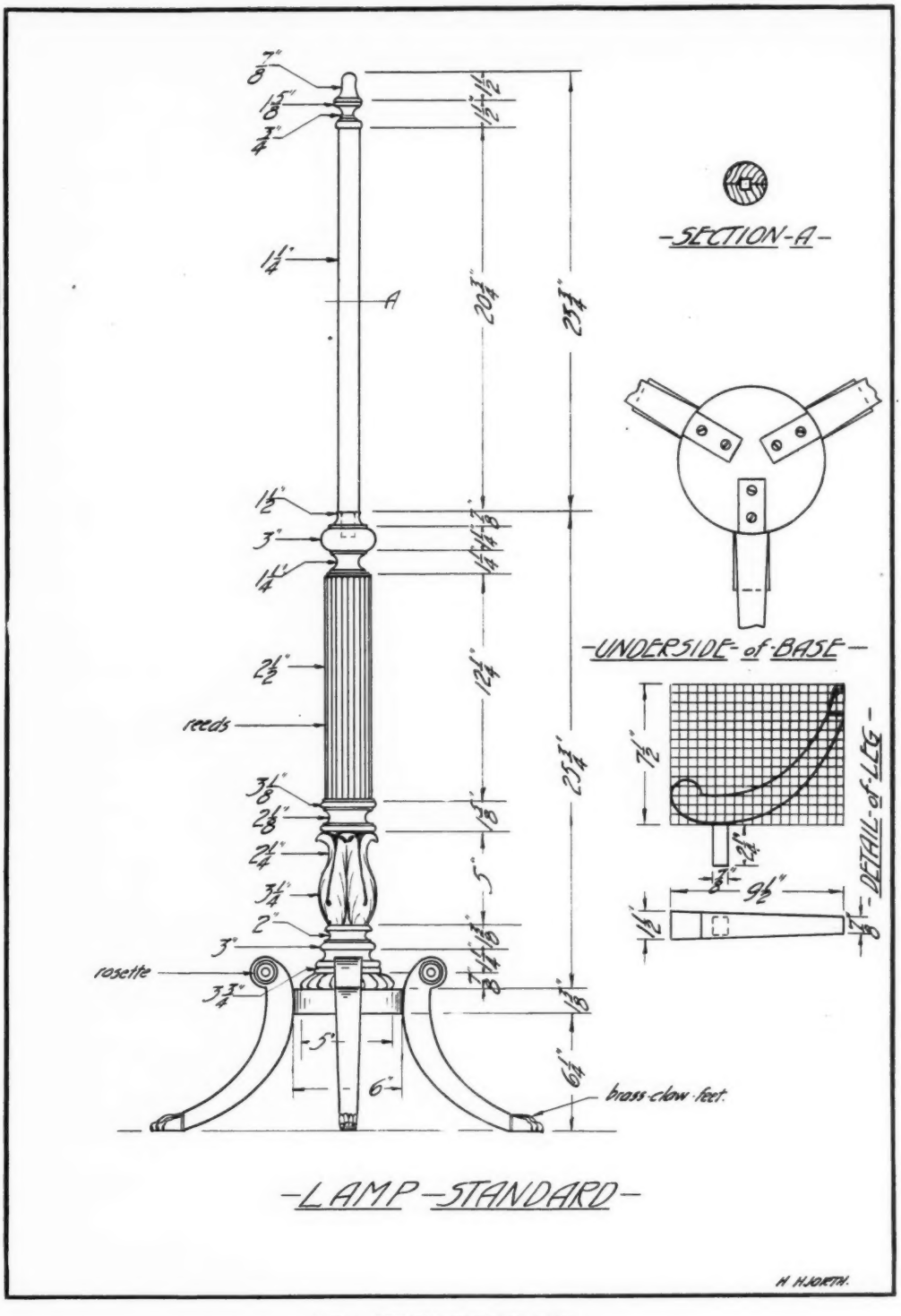


FIG. 4. DETAILS OF FLOOR LAMP.

The two parts of the upright are joined with a mortise and tenon joint as indicated on the drawing. A ⅜" hole about 1½" deep is bored in the end of the lower piece before it is put in the lathe. A plug ⅞"x2" is then turned to fit this hole snugly, after which the piece is ready for turning. This method insures the hole being well centered, and for that reason the mark of the dead center on the plug should not be lost. When the lower piece has been finished, the plug is withdrawn and a tenon turned on the upper piece to fit the ⅞" hole.

The base consists of a circular piece, 6" in diameter and three legs. A piece ⅞"x⅞"x3" is mortised into each leg, so that it projects 2¼" as shown. Corresponding grooves are cut on the under side of the base into which the three legs are carefully fitted, glued, and screwed. The carved piece ⅞"x5", resting directly on

FIG. 5.

the base, should be turned separately. The lower end of the upright has a tenon which passes through this piece and into the base. Simple reeding and carving, as suggested on the drawing, adds much to the beauty of the work. Each leg has two turned rosettes and a brass claw foot. The wires enter directly from the under side of the base. The fixture for the lights should be of the same type as that described for the table lamps, but instead of two outlets it should have three or four. Another treatment for the base of the floor lamp is suggested on the detail sheet. In this case the three legs are simply mortised into the upright.

CUTTING TRACING PAPER

Geo. E. Myers, Everett, Wash.

The standard size tracing paper used in the drawing classes is 9x12 inches. To cut this out of 25-yard rolls of 42" paper presented quite a problem. If the students were allowed to cut their own there was too great a waste; for the instructor to cut the several rolls used in a semester required too much of his time. The problem was solved in the following manner:

Two 12" and two 9" lengths were laid off on the width of the roll without waste. A band saw was used to make the cut. To avoid a slight tearing as the saw finishes cutting, it is better to rotate the roll after the saw has entered, rather than by a forward motion.

The 12" lengths are cut 9" long and the 9" lengths 12" long on the trimming board. This is easily done if one holds the paper taut, while another operates the knife.

TEXAS VOCATIONAL TEACHERS HOLD MEETING

More than 8,000 teachers met at Dallas, Tex., during the Thansgiving season for their annual convention, the general subject of which was "Education for Life." Commissioner of Education John J. Tigert spoke on "Modern Objectives in Education" which he declared were health, vocational education, culture, citizenship and character. He held that the modern educational system should lay great stress on vocational and industrial education. He stressed further the necessity for schools placing more emphasis on the dignity of labor and the development of vocational skills. Another address was that delivered by Sir. Moises Saenz, assistant secretary of education of Mexico, who spoke on the subject, "Educational Tendencies in Mexico." He pointed to one of the main objectives of Mexico's program, the reestablishment of the Indian Manual Arts, which include sewing, embroidery, and other native arts and crafts. He pointed to the progress made in the establishment of 800 rural schools and a teacher-training institution by January first. Others on the program were Royal B. Farnum of Massachusetts, who spoke on "The Call for Art Education," and Robert O. Small, director of vocational education in Massachusetts, who talked on the subject, "Vocational Education Today and Tomorrow."

The Vocational Education Association held its annual breakfast in connection with the convention, the speakers being R. O. Small, Supt. S. M. N. Marrs, and Hon. Mabel Walker Williebrandt, assistant attorney-general, Washington, D. C.

PRINTING TEACHERS OF NEW JERSEY FORM A NEW ASSOCIATION

Recently in the Institute of Arts and Sciences, Newark, a group of teachers of printing gathered for the purpose of forming a permanent organization. Even though the number was small the men did not lack earnestness nor enthusiasm.

Mr. R. Elmer Throssell, of the Cleveland Junior High School, Newark, the prime mover of the meeting, acted as temporary chairman and was chosen president in the election that followed. Mr. R. A. Loomis, Dickinson High School, Jersey City, was selected for vice-president, and Mr. Arthur Perry, of Rahway, was made secretary-treasurer. An executive committee, made up of the officers and four others to be appointed by the president, will draft the constitution and by-laws, decide on regular times of meetings, determine amount of dues, and arrange programs.

At the meeting it was decided to have a sectional meeting and a speaker at the Convention of the New Jersey Vocational Teachers' Association at Paterson in March. Mr. Greengrass, printing teacher in Paterson, assured the men that the printing teachers and their work would be given every accommodation.

It was also brought up that considerable benefit could be gained by attending and exhibiting specimens at the time of the conventions of the Eastern Arts Association. The printing teachers have been invited to have a meeting at the same time as the E. A. A. Convention in Syracuse, April 21-24, this year. Arrangements for the meeting have been begun and will be announced later. Information may be had by addressing the officers of this association.

The printing teachers of New Jersey, when they have been more thoroughly organized, will hold group meetings with organizations from other parts of the eastern district. At these meetings an interchange of ideas will be possible and much benefit gained by all who attend.

WESTERN ARTS ASSOCIATION AND VOCATIONAL EDUCATION ASSOCIATION OF MIDDLE WEST TO HOLD MEETING

The joint meeting of the Western Arts Association and the Vocational Education Association of the Middle West will be held March 17th to 20th, at Des Moines, Ia. The programs for the two associations have been outlined and the final program will give each an opportunity to develop individual sessions of special interest to the members, and at the same time, to combine in other sessions where the combined resources of the two make possible programs of unusual merit.

It is planned to hold the sessions, as well as the commercial exhibits and exhibits of school work, in the Fort Des Moines Hotel. The main lobby, as well as the mezzanine floor and the sample-room floor will be devoted to these features.

The local committee in charge of entertainment has arranged a number of unusual features for the entertainment of the visitors in attendance at the meeting. The school authorities are just completing a $7,000,000 building program, and the new junior and senior high schools are well worth inspection by the educators in attendance. The State College at Ames is only thirty miles distant, and the president and faculty have invited the delegates to visit the institution. The dean of the home economics department will keep open house in the new building devoted to home making education.

Information concerning the meeting, program, and hotel rates may be obtained by writing to Raymond T. Fell, secretary of the Western Arts Association, Dayton and Baymiller Aves., Cincinnati, or to L. W. Wahlstrom, secretary of the Vocational Education Association, 1711 Estes Ave., Chicago, Ill.

High Lights of the Cleveland Convention of the National Society for Vocational Education

S. Lewis Land, Lecturer in Vocational Education, University of Wisconsin

The nineteenth annual convention of the National Society for Vocational Education, was held in Cleveland, Ohio, December 3-4-5. More than two thousand educators engaged in the task of making the American schoolroom a practical workshop and the American workshop a hall of learning, attended the convention.

Among other important matters discussed and acted upon was the adoption of a new constitution, changing the name of the National Society to the "American Vocational Association," and a proposed amalgamation with the Vocational Educational Association of the Middle West. It is expected that the amalgamation will be completed in March, when the Vocational Education Association of the Middle West meets in Des Moines.

The constitution adopted provides for the publication of a quarterly news bulletin by the association. In addition to this publication a bulletin containing the proceedings of the convention will be issued annually. In a special committee report it was recommended that a paid secretary be employed. It was further recommended that each state hold at least one meeting each year and that the American Vocational Association pay one-half of the expenses for a speaker for the local organization.

Perhaps the most important discussion was that of Dr. Prosser in a general session in which he defended the Smith-Hughes law.

The commercial exhibitors were there—26 in number. They were represented on the general convention program Friday afternoon, when Mr. Dean, chief wireless operator of the "ship," assisted by Miss Jean Elizabeth Rowe, distributed the prizes which the exhibitors gave away to the delegates.

In this short report an attempt will be made to indicate briefly the more important points covered in the general meetings, in the trade and industry section, and in the vocational guidance section.

I. General Sessions

There were two general sessions in addition to the banquet program and the Thursday night entertainment.

Dr. Prosser was given rousing cheers as he took the floor in answer to arguments of opponents and critics of Federal subsidy. This program was one of the outstanding events of the whole convention. Dr. Prosser spoke on "Abolishing the Fifty-Fifty Plan." His address was in answer to an editorial which appeared in the August number of Worlds Work magazine. Dr. Prosser opened by stating the point of view of the editor of Worlds Work. The editor has this to say in an editorial headed "Abolishing the Fifty-Fifty Plan":

"President Coolidge has twice questioned the wisdom of the fifty-fifty system, by which the Federal government gives aid to the various states."

"Objections to the system are these:"

"1. The very name Federal aid is a misnomer. It implies some sort of gift or gratuity from the government, whereas the truth of course is that money which the Government pays to the states under the name of Federal aid, it first collects from the people of the states through the levy of Federal taxes, because the Government has no revenues except what it raises through taxation.

"2. The Government could supervise and control none of these things (agriculture, roads, education, health) directly, because in so doing it would be violating the plain limitations of the Constitution. But under the fifty-fifty system the Government gets this right by exacting it from the states as a condition of their receiving back any part of the moneys which their people were taxed to raise. In other words, the Government gets indirectly and by bargain the right of supervision and control for local affairs which it could not supervise or control directly. This is the insidious and vicious part of the system.

"3. The system involves the creation of large bureaus in Washington to administer it, and builds up a bureaucratic Federal Government. This causes the inevitable consequences of incompetence and red tape in administration, and evermounting costs and extravagance.

"4. The system tends to impair state initiative and incentive. Nothing could have a more deadening effect upon a state's endeavor and determination to solve and settle its own problems than the cry, 'Let Washington do it.'

"5. The system tends to draw state funds which may be more needed for other local purposes. People are slow to realize that the Federal money is actually their own money which the Government taxed them to raise. They seem to think that somehow it is a gift and that by matching it with state funds they will be getting something for half price.

"6. The amount of Federal aid returned to a state bears no relation at all to that state's contribution to Federal revenues. The basis of apportionment is generally rural, urban, or total population or mileage, or else there is a flat appropriation. The result is that the wealthier states carry the burden of the poorer states. Yet, the wealthier states must keep on doing this as long as the system lasts. They must come in under the system, let their citizens pay and get back for themselves a little of what they pay, because if they do not, their citizens will pay anyhow and the other states will get it all.

"7. The Federal supervision and control tend to result in standardization in affairs which ought to be settled by the home people in each state in accordance with their home wants and needs.

"8. Finally the rapidity with which the system has grown is one of the most alarming things about it. It is still growing. It seems to grow by what it feeds on."

And then he closes his attack with this challenge: "These are the arguments against the system. Governmentally, they seem to me to be not only sound but unanswerable." Dr. Prosser gave a ringing message in answer to this challenge.

"I wish to allay any unwarranted fear that the act will be repealed," said Dr. Prosser. "Neither is there any ground for the rumor that President Coolidge is against the Smith-Hughes act. There is talk in the east, rather provincial, in my opinion, that President Coolidge is against the Smith-Hughes act. That is not so. Coolidge is a farmer and as such he knows the benefits that accrue from the bill to agriculturists." Furthermore, he said that the people are not ready for a repeal. In answer to the charge that the system creates extravagant bureaus, he said that he had made inquiry and found that the Federal board has a staff of only 24 members.

However, he suggested that it be well to "speak softly, but carry a club." He also suggested that a committee might be appointed to look after the interests of the Smith-Hughes act. But more important than anything else he said, was that the members, "go home and do a better job."

It is evident from reading the editorial quoted above that the editor is thinking in terms of the state and not the nation. Dr. Prosser said that we should have a broader conception of a great democracy, and think in terms, not of narrow provincial boundary lines, but in terms of one great democratic commonwealth. "If democracy means anything at all, it means equality of opportunity."

The other general session was addressed by State Superintendent Vernon M. Riegel, Columbus, Ohio. and O. W. Rosenthal, President, Builders' Association of Chicago.

Supt. Riegel called upon the public schools to free themselves from educational snobbishness. Children are being taught, he said that if they will learn their lessons well, they may become great men and women—so "great" that they will not have to work for a living. "Our schools," he said, "have been inculcating in the minds of children the idea that only certain types of work are worthy. They have been training boys and girls to get out of life all they can for themselves, and not to give back worthy service to society. Instead of apprenticing them to honest work, we have been holding out to them the hope that through education they could be exempted from work."

Closed shop conditions in the Cleveland building trades were injected into convention discussions for a moment when O. W. Rosenthal, President of the Builders' Association of Chicago, deplored the fact that building trade apprentices graduated from East Technical High School had no choice as to their working conditions but to join the unions.

Supt. R. G. Jones, of Cleveland, spoke in defence of vocational training, but warned against some of its dangers. "There is no good excuse for hurrying children into prevocational or vocational work because they cannot get on with their studies," he said. "The notion of entertaining dull children by handwork is of doubtful value. Dull pupils will be dull in any subject. Dull teaching will be dull in any subject. We can't dodge poor teaching by changing the subject."

II. Trade and Industry Section

The first trade and industry section was addressed by Frederic E. Searles, superintendent of Ford Motor Co. Schools, Detroit, Michigan; E. W. Kempton, educational director, American Steel and Wire Co., Cleveland; and C. G. Gaum, professor of engineering extension, Pennsylvania State College.

"Vocational training can be made self-supporting when conducted by industry and can even be made to carry the overhead of the academic training," Frederic E. Searle declared in his address. "Many men in industry have had

little opportunity for schooling, but possess considerable ability to master academic work," Searle said. "The company I represent has adopted a policy that all academic training shall be given the employee after or before he has worked his full day in the shop. For classroom instruction he receives no pay. Industry is demanding greater accuracy and shorter processes. Today we are making large dies, in weeks instead of months. All shop instruction must be given on company time."

The speaker declared that public schools are seriously handicapped in giving training adequate for prospective tool makers, because of inability to reproduce actual shop conditions.

The second session of the trade and industry section was addressed by Dr. Prosser; L. A. Wilson, state director of vocational education in New York; Anthony Goldenberger, principal, Pittsburg Continuation School; Robert H. Rodgers, chief research division, Milwaukee Vocational School; and George Dauthal, member of Cleveland Building Trades Employers' Association.

L. A. Wilson spoke on vocational education as he found it practiced in London and Paris. "There is a great fear in England of losing her industrial supremacy," he said. "But, that very fear is to make England supreme in craftsmanship. For well do her industrial leaders realize that only through superior craftsmanship can they hold their own."

Robert H. Rodgers spoke on types of instructional material that can be used in vocational schools. In opening his address, he said, "It is necessary from time to time in the development of new undertakings, to pause and consider the road that has been traveled, to critically evaluate the procedure and methods which have been employed, and to restate the objectives in order that all possible obstacles on the road ahead may be anticipated."

A third trade and industry section was conducted by R. L. Cooley, director of the Milwaukee Vocational School. Mr. Cooley said that one of the big mistakes frequently made in vocational education, is that the vocational school is made to be a continuation of the full-time school. He said that the continuation school is in fact an adult school because those attending it are self-supporting. These schools must also be part-time vocational schools, since those attending them are in some sort of vocational or occupational work.

Professor Stewart Scrimshaw, of Marquette University, discussed the subject "The Place and Limitations of the State in Apprenticeship Training." He told the members something of the manner of administration of the apprenticeship system in the state of Wisconsin. There were advantages and disadvantages, he said, in the administration of apprenticeship by a state industrial commission.

III. Vocational Guidance Section

Problems of vocational guidance occupied an important place in the deliberations of the convention. Franklin J. Keller principal of the East Side Continuation School in New York. in discussing the subject, "Putting Guidance to Work," said that while the primary purpose of school education has always been guidance of some kind or another it has only been within the last twenty or thirty years that phases of education known as vocational guidance have been included in our system of education. "Such vocational guidance has necessarily taken the form of counseling with reference to the courses already found in the full-time school. The junior high school goes one step further. The continuation school, however, goes one step further, by not only developing its courses and organizing its classes with specific reference to vocational guidance, but by putting to work factors which full-time schools cannot use. The benefits arise principally out of the fact that the school is conducted pari passu with occupational experience and therefore can appropriate to itself the pedagogical advantages of good motivation. The continuation school, better than any other type of school, can put to work those principles which we generally agree are basic and sound."

The strength of a vocational guidance scheme, he said, lies in the following: "1 Present and ultimate happiness of the person guided. 2. Discovery of all aptitudes. 3. Recognition of all weaknesses. 4. Training for success. 5. The finding of opportunity to exercise aptitudes."

He said that the continuation school is effective in vocational guidance for the following reasons: "1. It can at every point check up the present and sometimes the future happiness of the young worker. 2. It has every facility to discover aptitudes. 3. It has every facility to discover weaknesses. 4. It can give vocational training. 5. It can furnish the required opportunity for the worker to exercise his talents."

In addition to the programs which were arranged in the vocational guidance section, opportunity was given the members of the convention to visit some of the leading educational and industrial agencies in Cleveland which are administering vocational guidance.

Officers Elected

Mr. Edwin A. Lee, of the University of California, was elected President for next year, and Mr. Lewis Gustafson, President of the David Ranken Junior School of Mechanical Trades was made Treasurer. The Secretary will be appointed by the executive committee.

VOCATIONAL EDUCATION SOCIETY OF BOSTON

The Vocational Education Society of Boston held its monthly meeting Saturday, December 12th, in the Everett High School, with luncheon served by the domestic science department of the school. Superintendent Fairfield Whitney of the Everett schools welcomed the Society, and in his talk furnished some interesting data concerning the history of practical arts subjects in the school curricula of the city.

Mr. Whitney harked back to the introduction of drawing into the Everett schools in 1894. Sewing followed in the next year. Commercial work came in 1896. Not until 1902 was a beginning made of Sloyd work for boys. Before its introduction, the man who was at that time superintendent of schools took a course in Sloyd in Boston, for the purpose of acquiring knowledge of the "innovation." In September, 1910, household arts for girls and various types of specialized shop work for boys were new offerings in the curriculum. This work has been carried on and amplified, and Everett today is proud of the opportunities which it offers its young people.

Nineteen-twenty saw the establishment in Everett, as elsewhere in the state, of a continuation school which places emphasis on shopwork. In 1923 the high school moved into its present new quarters, with ample provision for its industrial and domestic work; and the junior high school took over the old shops and began offering a diversified prevocational program.

Although many graduates of Everett's school shops go into industries to which they have been introduced in school, the entire program is prevocational: it aims to lay as broad a foundation as possible, without hurrying occupational choice. It is not unrecognized, however, said Mr. Whitney, that in a city the size of Everett there is a group of school children whose needs are not entirely met by such a program. This group would include the "hand-minded" pupils, and those under economic pressure. For these, a straight vocational program is the logical next step. This step may be undertaken in the near future. Fifteen prevocational printing boys in the junior high school have expressed a desire to take a vocational course if offered. It is quite possible that Everett will next year establish a state-aided vocational school, starting with this trade.

President Robert E. Baker of the Society called the business meeting to order. After a vote of thanks to Supt. Whitney and other members of the Everett School Department, the names of five candidates were voted upon for membership. Announcement was made of the completion of arrangements for a special trip during the winter to the Massachusetts Institute of Technology.

Mr. Raymond G. Fuller, secretary of the Massachusetts Child Labor Committee, was then introduced. President Baker warned him that most of the persons present "had to work when they were kids." Mr. Fuller referred to the popular misconception that a child labor reformer is "one who hates work," and talked on the real spirit and purpose of the movement. He asseverated that no sensible person wants childhood to be unoccupied; but that the child labor reform movement is interested in seeing that childhood is **well** occupied. All children are entitled to play, work, and schooling. In our more primitive days, and even at present in rural communities, farm and household employment automatically gave a properly balanced program to the children. It is deplorable that many city youngsters today grow up without adequate work. That this is an evil, no one is quicker to realize than the child labor reformer. The Junior Achievement League and similar organizations are doing a praiseworthy work in combating this lack.

Give a child work which intrigues and interests him, said Mr. Fuller, and you do him a real favor. Neither character, contentment, nor preparation for adult life are

served by idleness. Not merely in one direction lies that lack of balance which makes Jack a dull boy, or a vicious boy. All that is being done to advance vocational guidance, prevocational, vocational, continuation and cooperative schooling, has the approval of those interested in child labor reform.

Though "child labor," as distinguished from "child employment," existed before the industrial revolution, that great change of a century ago turned it into more harmful types. In colonial America, practically all employment of children was in home occupations, directly under parental supervision; or else in apprenticeship under a system which contemplated not merely preparation for a skilled craft, but preparation for life and citizenship as well. The relation of master to apprentice was modeled after the relation of parent and child. Child labor reform aims toward a restoration of the safeguards which then existed in the employment of children, but which have been lost in the vastly different organization of modern industry.

Never have children been so well off as here and now, declared Mr. Fuller. In this country, the extreme of poverty which might make child labor apparently necessary has been abolished by our prosperity.

More than two and one-half per cent of factory employees in the United States are under 16 years old. This group is exposed to conditions and dangers against which we need such provisions as working certificates, medical examinations, and restrictions as to hours and kinds of employment. "No one was ever injured by work"; but the kind of work, the conditions under which it is done, the mental and moral hazards surrounding it, and the degradation of work which selfish or thoughtless persons permit to take place, must be guarded against.

After all, said Mr. Fuller, the antithesis of child labor is not idleness, but education. School is not the only means of education. Work of a proper sort may be superior to it in importance, and certainly is after one has reached adult age. But modern conditions have taken away from work to a very large extent the educative possibilities and functions which it possessed in former days in the home or in apprenticeship; and we have assigned these functions, and are increasingly assigning them, to the schools. The recent report of the Massachusetts Superintendents' Committee, and the legislation which it proposes, are endorsed by child labor reformers. Real reformers, Mr. Fuller pointed out, are actuated not by sentiment chiefly, but by knowledge based on research; and their efforts are not confined solely to legislative channels. The greatest force against uneducative and harmful child labor, greater perhaps than all the regulatory and prohibitive laws that are on the statutes, is the growing emphasis upon and public support of education, which is "the eternal debt which maturity owes to youth."

—**Frederick Ames Coates.**

THE INDUSTRIAL-ARTS ROUND TABLE

The meeting of the Chicago Industrial-Arts Round Table, at the Pullman Free School of Manual Training, December 11th, was a meeting "on wheels." A tour through the shops of the Pullman Car Company, in the afternoon, gave the members a clear idea of how an industry changes in a few years from a wood-working plant to one using chiefly steel. About 55 men partook of a dinner prepared by the home economics department. This department exhibited some fine sewing and showed an up-to-date apartment in which families of girls live right in the school.

In the meeting which followed, Mr. Y. G. Willis introduced five men in charge of departments of school work. Mr. Wm. C. Brubaker spoke on the subject, "What is Desirable Coordination Between School Departments?" Mr. Brubaker gave a picture of happy relations where there is united management. He stressed voluntary and spontaneous coordination and said that it is often found that the bulk of work frequently tends to fall on one department. Mr. Brubaker raised the question, "What should boys work on anyway? Individual work or shop work for the entire school?" An esprit de corps should be developed. Again, if one of the senior teachers in years of authority passes on the requisition for the project materials, the other departments of the school may give aid in establishing an understanding of the principles which the projects should illustrate. By fitting together the various phases of work, the activities of the school may be coordinated into a balanced whole.

Mr. A. A. Neff, instructor in drawing, presented two elements to be met and solved. A boy striving to get on with his drawings, may become discouraged at the technique required to make the first few drawing plates look presentable. The teacher ought to share the attitude of the boy that lettering is not the main objective, but merely a means to an end, and that there is a relation between good lettering and good draftsmanship. Ability in drawing parallels the appearance of a drawing, and lettering is often an index of native talent. Mr. Fultz of the Sterling Morton high school, commented on the practice of teaching lettering, and declared that a little lettering once in a while as the boys advance induces a better attitude than too much lettering at one time.

Mr. R. S. Royster demonstrated "Some Devices and Helps for Teachers of Manual Arts." Among these were various tests of different types for separate purposes. The examination, or test, he said, is a time to think, and the answers should be short and fairly uniform. Another device which elicited much favorable comment, was a check list of errors and improvements. This list may be tacked to the drawing board and may be consulted by both instructor and pupil, while the drawing is in progress. It makes clear practices to avoid, and it saves the teacher's time in explanations of the required standards of a drawing.

Mr. Andrew Kuyper, instructor in machine shop work, declared the object of training to be the development of trained men for all-around work, not specialists. Modern tendencies, he said, tend to draw the trained worker and the boss apart, but there appears a need and a place for the capable mechanic. Men change jobs frequently; then, too, men become sick, and machines must be kept running. Only a trained worker can get the required production from a machine with a new hand, because he knows what a given machine can produce, if properly maintained. The shop also furnishes a splendid field for training in safety first methods. The instruction may be expensive and may not always be imbibed, but learning by the job is more expensive.

Mr. Willis made a brief mention of the previous training of the men connected with the Pullman school, and told of work now being done in higher institutions. One man, it developed, is able to handle a class of forty boys, all working on individual projects, for four hours daily. Jobs are assigned in advance, and the boys acquire a good deal of information before checking the material out of the stock room. The foreman system is used for distributing and collecting equipment and supplies.

Mr. H. J. Ruppert, of the Lane Technical High School, Chicago, evidently started something with his "hack-saw" theory of education, when he said it was time for the technical schools to make an organized effort to attract the better class of students. Shopwork is usually what the boys perform and the day has come when it is no longer up to the teacher to do the boy's work for him. Each one is responsible for certain equipment, certain time spent, and certain results. The shop is the last word Democracy has for the average boy.

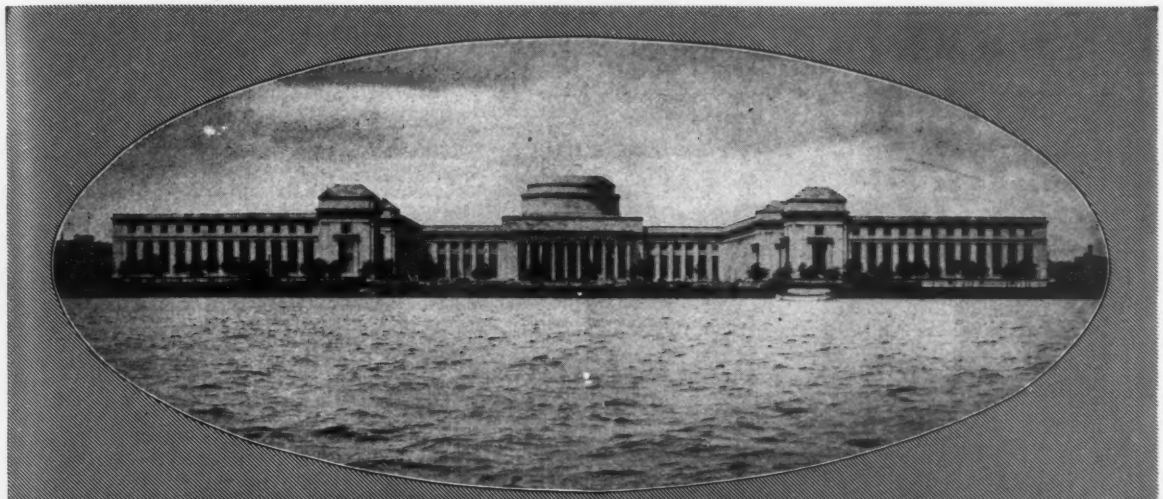
If anybody was not sold on the idea of coordination, I did not hear it, as after the formal discussions broke up, groups of men gathered in the lobby of the school to discuss the matter further.

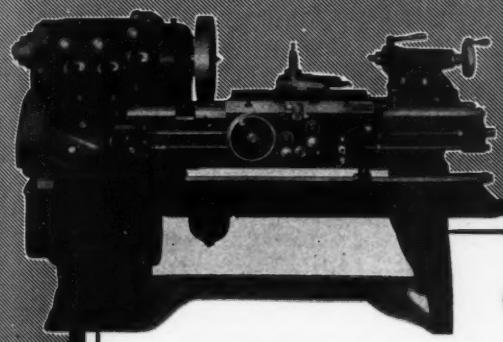
The round table will meet again on January 15th, somewhere in the Loop.

Robert B. Bagby, Secretary.

Committee Appointed to Study Akron Industries. A committee was appointed in September to make a study of the industries and educational facilities at Akron, O. For this purpose, the board appointed three of its members to constitute a vocational committee and also several citizens to act on an advisory committee.

The duties of the committee were enlarged to include a study of the plans of school organization. Three meetings of the committee occurred during the week of December first, at the time of the conference of the National Society for Vocational Education, and they secured as speakers Dr. R. O. Small of Massachusetts, Dr. R. L. Cooley of Milwaukee, Wis., and Dr. E. W. Barnhart, of the Bureau of Education, Washington, D. C. A number of additional meetings have been arranged, also visits to other cities in search of additional information bearing on the city's industrial problem.





and now —

The Massachusetts Institute of Technology uses The

MONARCH Helical Geared Ball Bearing LATHE

as a part of their Metal Working Equipment.

The prestige of this Institute—the corner-stone of Massachusetts' enviable system of vocational education — attracts students from the four corners of the civilized world.

In choosing the equipment for these students, the directors of the Institute must base their choice upon equipment that will give students the greatest possible amount of experience.

We are proud of the selection of the MONARCH Engine Lathe as a part of the Institution's metal working equipment — proud that it has been selected solely upon its merit, after careful consideration, as the type of equipment necessary for the high degree of training which Massachusetts "Tech" gives to its students—a training which has been so creditably reflected on the Institution by its graduates.

We shall be glad to plan your vocational metal working shop. Give us a statement of your requirements and let our Free Engineering Advisory Service plan your shop, giving you an accurate estimate of the entire equipment cost. This service is gladly rendered without charge.

THE MONARCH MACHINE TOOL COMPANY, 404 OAK STREET, SIDNEY, OHIO.

Good Schools deserve "Yankee" Tools

You'll find good mechanics using "Yankee" Tools. They know that these ingenious tools improve work and save time.

Here's a tool that respects a man's time

Any kind of a screw-driving job can be done in fast time, if you use a "Yankee" "Quick-Return" Spiral Ratchet Screw-driver No. 130-A.

There is a spring in the handle that brings the handle back after each push; and the tension of this spring keeps blade in screw-slot, leaving one hand free to hold the work.

All you need do is push. The spring in handle and the "Yankee" Ratchet do the work.

Three Ratchet adjustments. Right-hand Ratchet, Left-hand Ratchet and Rigid, secured by touch on Ratchet Shifter.

"YANKEE" "Quick-Return" Spiral Ratchet Screw-Driver No. 130-A

Three sizes of bits supplied with each tool. No. 130-A, Standard Size. No. 131-A, Heavy Pattern. No. 135, Light Pattern.

"Yankee" Spiral Ratchet Screw-drivers, without the "Quick-Return" feature, No. 30-A, No. 31-A, No. 35.

"A" indicates improved model with longer driving nut.

Some other "YANKEE" Tools

Plain Screw-drivers	Automatic Feed Bench Drills
Ratchet Screw-drivers	Ratchet Tap Wrenches
Ratchet Bit Braces	Vises, Removable Base

Automatic Push Drills

Dealers everywhere sell 'Yankee" Tools

"Yankee" on the tool you buy means the utmost in quality, efficiency and durability.

Tool Book Free — Tells all about the famous "Yankee" Tools. Write for your copy today.

NORTH BROS. MFG. CO., Philadelphia, U. S. A.

"YANKEE" TOOLS

Make Better Mechanics

NEWS AND NOTES

Vocational Agriculture. Twenty-four high schools in Montana have Smith-Hughes departments of vocational agriculture. Evening classes in vocational home economics are being conducted at present in fourteen centers of the state.

Offers Secretarial Course. The High School of Commerce, Detroit, Mich., is offering a post-graduate secretarial course for students who have completed the regular high school course. The aim of the course is to prepare students through intensive study for secretarial positions.

Course in Home Economics. A course of study in home economics education for elementary, junior high, and senior high schools is being used for the first time this year at Baltimore, Md. The course has been developed as an outcome of study, covering a number of years, by home economics teachers and supervisors, in order to adapt the work to meet needs in the homes of the pupils.

Rural Schools Have Industrial Subjects. Three hundred small rural schools in Texas have accepted the provisions of the general aid law and have introduced instruction in industrial subjects, according to plans approved by the state education department. The state contributes aid in installing equipment for teaching farm mechanics, household arts, and practical agriculture.

A Workers' Pageant. A pageant of workers, portraying 48 different occupations, was recently presented by vocational guidance classes of Clifton Park high school, Baltimore, Md. Each student taking part was dressed to represent the occupation chosen and carried appropriate equipment. There were scenes showing educational and health work, industrial life, art, home, and patriotism.

Boys Complete Cooperative Industrial Course. A class of 150 high school boys recently completed the cooperative industrial course at the Hyde Park High School, Boston, Mass. The boys were the pupils of James C. Clarke in the cooperative industrial department and each had earned $300 while attending school.

Each of the boys was an apprentice in industry and each learned his trade while taking his school course. Upon graduation each takes his place in the industry.

The cooperative department is a new plan of industrial work, based on the fifty-fifty basis, with one week in school and the next in the industry. The plan was first tried out in a Boston grammar school in 1908 by the instructor, Mr. Clarke, and this department is now the parent of five similar institutions in Boston for training boys for the industries.

It is pointed out that no fewer than twenty shops, among them some major industrial organizations, are finding jobs for the Hyde Park boys. One of these concerns has secured a shop foreman, a drafting room foreman, and a branch manager, in addition to a score or more of draftsmen and machinists from the cooperative classes.

The boys complete their 6,000 hours of shop requirements in some cases sitting beside graduate students of the drafting board, and for the time being do the same work as the college-trained engineers.

In the first, or preliminary year, the boy spends eight hours of every week in the school shops or drafting room, learning to use the drawing board, the blue print and power drill. The remaining time is given to academic subjects closely allied with the subject.

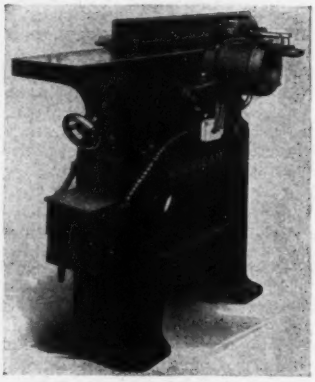
In the second year, the boy chooses the trade he desires to enter and signs a contract with the instructor. He then enters upon the dual role of student and shop apprentice. The cooperative working plan is reserved for the two upper classes.

New Evening Courses. A number of new courses have been added to the evening school work offered this year in the high school at New Kensington, Pa. The courses include cabinet-making, economics, metallurgy, industrial chemistry, bookkeeping, business English, home economics work, and Americanization. The total number of students enrolled this year is 360, as compared with 130 last year.

Beginner's Sewing Class. A beginner's sewing class has been formed at New Kensington, Pa., to offer elementary instruction in the making of simple articles of clothing. The class receives instruction in such fundamental principles as stitching, use of equipment, and the making of plain garments. Each student aims at completing a real dress before the class is over.

—**The Wisconsin department of agriculture** has issued a pamphlet describing the state's wood-using industries. The pamphlet is liberally illustrated.

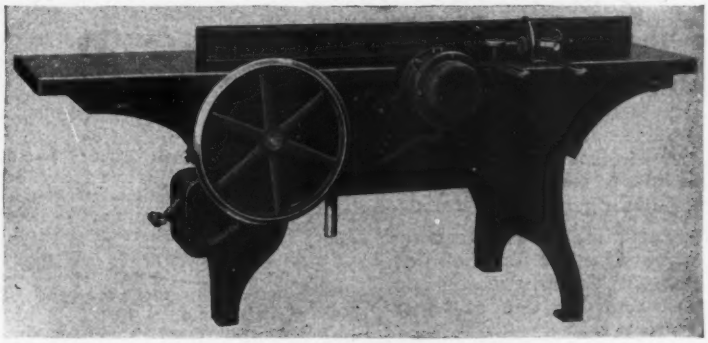
(Concluded on Page 26a)



American No. 1 Bench Jointer

Knowledge Gained on American Machines will never Desert You

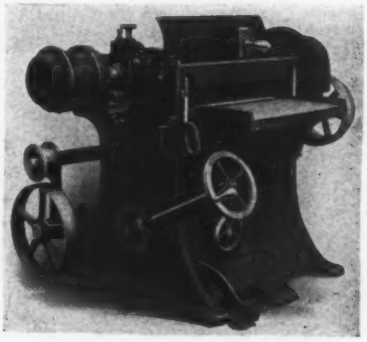
Training in Shop Practice should always be done on real shop machine.



American No. 1 Buzz Planer and Jointer

American Machines spring from the highest requirements of the industries. They are industrial machines.

"The tools of school are the tools of life"



American No. 1½ Single Surfacer

Yates-American Machine Co.

Educational Department

ROCHESTER, N. Y.

See the Point?

Some people think the point of a drill is the extreme tip of the cutting end!

Actually, that extreme tip is known as the "Dead Center"—while "The Point" is the *entire* cone-shaped surface at the cutting end. All that you see in the illustration above is "The Point."

This is only one of the many interesting and instructive definitions to be found in the Handbook for Drillers. In it every part of a twist drill is clearly and simply described—plus a great deal of useful information on grinding, cutting speeds, feeds and how to secure the best results when drilling in various metals.

Vocational Directors and Instructors are invited to ask for copies of the Handbook, in any reasonable quantities, for the use of their machine shop classes.

The CLEVELAND TWIST DRILL COMPANY CLEVELAND
NEW YORK-CHICAGO-LONDON

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

Manufacturers of Carbon and Cle-Forge High Speed Drills for every purpose; "Mezzo" Super-Carbon Drills; Hand, Jobbers' and Shell Reamers; "Peerless" High Speed Reamers; "Paradox" Adjustable Reamers; "Quick-Set" Reamers "Spirex" Machine Taper Pin Reamers; Chucking Reamers for Turret Lathes; Counterbores; Countersinks; Sockets; End Mills; and the "Ezy-Out" Screw Extractor.

(Concluded from Page 24a)

Evening Trade Schools. The school board of St. Joseph, Mo., has announced the opening of the evening trade schools with the opening of the new year. It is planned to operate a day trade school some time during the year.

Christmas Greetings. The printing department of the Utica Free Academy of Utica, N. Y., has just issued a small four-page Christmas circular and a card bearing the greetings of the season. The printing is in black and the color scheme of the decorations is red and green.

Automotive Course. The boys of the agricultural department at Falmouth, Mass., have the opportunity this year as usual to study automotive engineering. The work will be done in the garage of the local motor car company under the direction of Mr. John Barry and Mr. Lewis Robinson. The course will run through January and February, an eight weeks' period.

Christmas Toy Shop. Industrial arts teachers in Chicago and vicinity inspected the work in the toy shop of the Parker School, which was open from December 7th to 11th. The toy shop is an annual activity, in which the entire school takes part. The products go to needy children.

Michigan Printing Teachers Hold Meeting. The Michigan State Printing Instructor's Society held its semi-annual meeting on October 30th, at Grand Rapids, Mich. Mr. Harry P. Buboltz acted as chairman of the meeting.

Mr. Herman Versput, president of the Grand Rapids Craftsman's Club, spoke on the subject, "The Relation of the Printing Instructor to the Employer"; Mr. K. G. Smith of Lansing, talked on "Qualifications of a Printing Instructor." The next meeting will be held in Ann Arbor in April.

New Jersey Vocational Association to Hold Meeting. The New Jersey Vocational and Arts Association will hold its meeting in Paterson, N. J., on March 19th and 20th. Among the speakers wil be F. E. Mack of Trenton; F. J. Rodgers of Elizabeth; Ernest Tuttle, East Orange; Walter Schrick of Elizabeth, and Mary Buckley of Paterson.

Maryland Vocational Guidance Teachers Hold Meeting. The Educational and Vocational Guidance Section of the Maryland Teachers' Association held its annual meeting on November 27th at Baltimore, in connection with the meeting of the State Teachers' Association. Mr. C. W. Sylvester of Baltimore, spoke on, "The Program of Educational and Vocational Guidance in the Baltimore Schools"; Miss Mary Stewart of Washington, D. C., talked on "The Place of Placement in a Guidance Program," and Wm. H. Vickers of Baltimore discussed Vocational and Educational Guidance as Seen by the American Management Association.

To Enlarge Industrial School. The capacity of the Hershey Industrial School at Hershey, Pa., is being increased to provide for one hundred additional orphans. The school antedates by some years the formation of the trust fund in which are the Hershey Chocolate Company, a trolley company, and light and power and other utilities, valued at $60,000,000. There were over one hundred students enrolled when the trust was created. The building program has kept pace with the enlargement of the institution, and at present there are five buildings on the campus, with 177 boys as students.

The building program provides for four new buildings, for living quarters for the new pupils. Plans are also being drawn for a larger building with an assembly room having a capacity of 400, classrooms and a gymnasium. The completion of these buildings will provide ten structures forming the nucleus of the institution.

Homemaking Instruction for Women and Girls. Evening classes for women and out-of-school girls have been organized at Lanett, Shawmut, Langdale, Fairfax, and Riverview, Ala. Instructional units in children's clothes and plain sewing are taught. The instruction is followed by work in simple millinery, home decoration, meal planning and preparation.

Organize State Vocational Guidance Association. A Wisconsin Vocational Guidance Association was organized in November, at Madison, Wis. The association is statewide and will be affiliated with the National Association. The following officers were elected: President, S. Lewis Land, University of Wisconsin; Secretary, Regina E. Groves, Madison Vocational School; Treasurer, G. B. Cox, Wisconsin High School, University of Wisconsin.

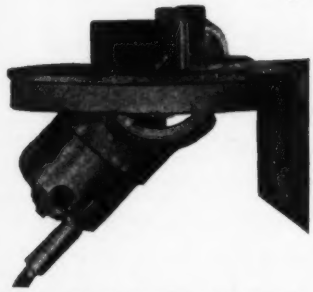
Vocational Aid Approved. Oak Hill, Tex., schools have been approved by official examiners for vocational state aid.

Students Turn Out Professional Work

with Carter Shapers and Routers

So easy to operate are the Carter Electric Router and Shaper that students can turn out real professional work in a few trials. Students take to Carter machines because of their ingenious simplicity and the neat work they accomplish. With the various attachments the Carter Shaper or Router can be used for hundreds of different jobs. They are especially adapted for cabinet work or furniture making. Below are listed only a few of the ways in which you can use Carter Machines in your school shop.

Carter Hand Shaper, cutting a fancy beveled edge on a jewel box. Gives the same effect as hand carving, only neater.



Carter Hand Shaper with Bench Shaper Table. Tilting arrangement provides for making surface and corner cuts. Bench Table attachment, $22 extra.

Carter Router motor in Beading and Fluting attachment. Attachment, $15 extra.

A Few of the Uses for Carter Machines

With quickly changeable attachments the Carter Shaper motor can be used as a Hand Shaper, Bench Shaper, Bench Grinder, Buffer, Veneer Trimmer, Small Portable Saw, Corner Beader, Hand Drill, Tool Sharpener, etc.—the Router Motor can be used as a Router, Veiner, Beader and Fluter, Paneler, Mortiser, Veneer Patcher, Inlay Machine, Core Box Router, Hinge Butt Router, Newspaper Router, for free-hand carving, etc.

In Use From Coast to Coast

Hundreds of Grammar Schools, High Schools and Colleges from coast to coast are using these machines in their Manual Training, Printing and Maintenance Departments. Upon request we shall be glad to furnish a list of schools nearest to you.

Carter Hand Shaper
Price $32.00

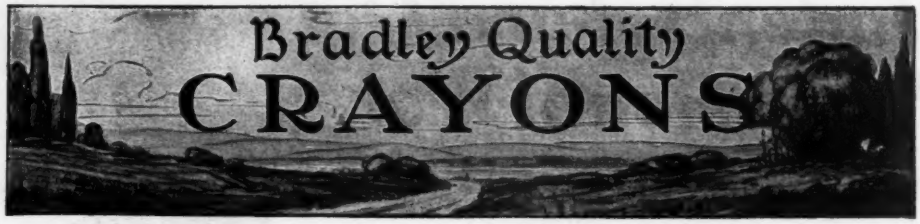
Carter Router
Price $42.00

Attachments extra.

Immediate delivery on any of our machines.
Write us for complete information.

THE R. L. CARTER CO., INC., 1208 Chestnut Street, Phoenix, New York.

CARTER PRODUCTS



A Wax Crayon For Every Requirement

ALL the Bradley crayons are manufactured in our own laboratories, where they receive the same careful attention that has made the Bradley Water Colors so universally popular. Only the choicest pigments are employed, and these are incorporated into the binding medium in such a manner as to guarantee freedom from grit, uniformity of texture, and perfect marking and blending qualities.

Catalog B illustrates, describes and prices more than a dozen numbers in the Bradley Wax Crayon line. You will find them on pages 15, 16, 17 and 18. If you have no copy of the catalog, write for it at once to our nearest address. We are always glad to send samples on request.

MILTON BRADLEY COMPANY
SPRINGFIELD, MASS.

Boston New York Philadelphia San Francisco Atlanta
Chicago—Thomas Charles Co., Agents. Kansas City—Hoover Bros., Agents

BUYERS' NEWS — TRADE PUBLICATIONS

Issue Bulletins Showing How to Do Important Repair Jobs in the Shop. The South Bend Lathe Works at South Bend, Ind., has issued two bulletins on How to Do Important Jobs in the Auto Repair Shop. Bulletin No. 85, entitled "Piston Bulletin," describes the machining of oversize and semi-finished pistons on the lathe, while Bulletin No. 86, entitled "Valve Bulletin," explains the turning and grinding of valve faces and the straightening of valve stems. The sheets are well illustrated and there are tables, showing capacities and sizes, and also specifications and net factory prices. Every machine shop and every auto mechanics shop should have these bulletins on file for reference.

Art-Fiber Furniture Weaving. DeLuxe Edition, cloth, 161 pages. Price, $1.25. Student's edition, gratis, with an order of $10 or more. Grand Rapids Fiber Cord Co., Grand Rapids, Mich.

This book is an illustrated story of the manufacture of art-fiber furniture, from the trees in the forest, to the finished product in the home. The designs suggested range from simple stands to complete suites of furniture so that anyone can select a project that will have personal appeal, and find a ready place in the home. Pupils may choose from lamps, ferneries, stands of various kinds, chairs, davenports, tea wagons, and almost every kind of woven furniture.

The book includes chapters on basket weaving, mats, seating, tray weaving, bird cages, book racks, bridge and boudoir lamps, candle-sticks, chairs, davenports, day beds, end tables, ferneries, work baskets, magazine stands, rockers, sewing stands, smoking stands, table lamps, tabourets, tea wagons, wood baskets, and writing desks.

Included in the book is complete information concerning equipment necessary for art-fiber weaving, also a detailed story of the materials used in developing the projects. Frames, weaving and finishing materials, fixtures, forms and tools can be supplied by the firm for all projects listed in the book. A very complete supply service enables the school to purchase all materials complete for each design at one price, or to order in separate units in any listed quantity.

Printers' Equipment. Periodically we receive a most interesting collection of small circulars which attract us because of their splendid design and superior typography. Each is a distinct example of the printer's art as applied to that familiar and useful, but frequently poorly done type of advertising circular, the "envelope stuffer."

The circulars we have in mind come from the American Type Founders Company, and advertise various minor and major products sold by the firm and of interest to teachers of printing. The latest collection advertises the Challenge Mammoth Iron Furniture, Chandler & Price job presses and cutters, Chandler & Price semi-steel chases, and utilities for the composing room.

Included, too, is a most interesting description of the service and operation of the Kelly automatic press prepared by a nationally known printer.

Copies of the circulars will be sent on request to the Educational Department of the American Type Founders Company.

NEW TRADE PRODUCTS

New Motor-Driven Boring Machine. The Gallmeyer & Livingston Co., of Grand Rapids, Mich., has just placed on the market a new horizontal boring machine, which is designed to fill the need for high grade accurate machines at a price within the reach of all schools. The machine is built of the very best material and with care as to details of design and workmanship. The motor shaft is extended and tapped out to take the screw shank bits commonly used. A Jacobs chuck of one-half inch capacity may be furnished at a slight additional charge.

NEW G. & L. HORIZONTAL BORING MACHINE.

Why it is easy to sell Walnut

Sentiment

The beauty of the American Walnut tree, and its usefulness, are deep rooted American traditions. Every boy and girl remembers with a thrill "nutting days" and grandfather's story of the walnut tree.

Pride

When the women "visit" and discuss the "homey" and intimate things, the ownership of walnut furniture is a source of pride and satisfaction. "My walnut" justifies with its beauty and enduring worth the honest pride of ownership.

TRADITIONS woven about American Walnut are powerful influences which furniture men do not always consider with proper appreciation. They are worth millions to the furniture industry. Walnut's traditional durability, stability and reliability are deeply rooted in the public mind. The beauty of walnut speaks for itself. The sentiment for walnut has played its part in fostering the great vogue for walnut furniture that has made it the most popular cabinet wood of the age.

"This Is the Walnut Age"

Our book "The Story of American Walnut" will make selling walnut furniture easier. It is full of fascinating facts about this premier among fine woods. Ask for it.

AMERICAN WALNUT

American Walnut Manufacturers' Association

Room 1236, 616 South Michigan Avenue

Chicago, Illinois

JOSEPH BRAHDY

Licensed Professional Engineer, New York
Brooklyn Vocational School
Brooklyn Evening Technical and Trade School

and

SAMUEL LANDSMAN

Registered Architect, New York
Brooklyn Vocational School
Bushwick Evening Trade School

A textbook for beginners in architectural drawing, written after two years of actual practice in the authors' classes, and designed upon the premise that the drawing of building plans requires some knowledge of constructional work.

It prepares the student for the work of the average architect's office.

One hundred eighty-eight plates delineate many important principles and help the student to visualize the technique of architectural drafting.

Illus. 10½ x 7¾ Cloth 140 Pages $2.50

Send for Examination Copies Today.

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D. VAN NOSTRAND COMPANY

8 Warren Street New York

On Approval Order Form

Kindly forward on approval copies of

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☐ Within 10 days ☐ If not adopted in my classes } I will either return the books or remit in full.

Name .....

School .....

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Combined Drum and Disc Sander

The American Saw Mill Machinery Company of Hackettstown, N. J., expects to make announcement soon of the perfection of a new combined drum and disc sander.

The machine which is illustrated herewith is particularly useful for sanding flat or bent work on the drum and for general disc sanding. The drum is 13″ in diameter and 16″ face with groove and clamping strip to hold and stretch the sand paper and carpet. One end of the carpet is fastened to the drum, the other end being clamped with the paper.

FIG. 913.

FIG. 914.

Drum Table is 21″x32″, with a suitable opening for the drum. It may be adjusted by means of screws to the required position for flat sanding. The table may be removed for sanding curves, etc.

The Disc is 18″ in diameter, and accurately turned and balanced. Disc Table is 10″x25″, adjustable to any angle up to 45 degrees in either direction. It is fitted with a groove and mitre fence for sanding angular work.

FIG. 915. SANDING A CURVE.

Main Frame is cast in one piece of sufficient weight and strength to prevent vibration. The Arbor runs in ball bearings and is regularly equipped with a pulley 6″ in diameter, and 4″ face. Ball bearing loose pulley furnished, when required, at extra cost.

This machine will also be furnished on order with motor mounted on bracket with direct connection to arbor at the drum end. The manufacturer states that the floor space occupied by the standard machine is 49″x32″, two horse power recommended, and the speed of arbor is about 1,000 R. P. M. It is further announced that the shipping weight is 675 pounds, export weight 800 pounds, and cubic contents 24 cubic feet.

Figure 913 illustrates the machine sanding the end of a mitre. Figure 914 shows the table dropped to a 45 degree angle, and also the mitre gauge in use which provides for sanding a compound angle. Figure 915 illustrates the machine with the main table removed for sanding a curve.

What Can You Do With Him?

ANN SCHRIBER

Meet Henry Maxwell. You know him; probably have several boys just like him in your school.

Henry is a Boy Scout, plays right forward on the Junior Basketball Five, can "lick any guy in the neighborhood," and hates to study.

How in the world can you interest a chap like Henry in art?

Ask him to design a poster for a basketball game. First he should submit a small pencil sketch of the idea. When that is approved, watch him proceed with the main poster. The fascination will increase as the work progresses.

Of course, the wise teacher uses "Prang" Tempera, the better showcard color for all such purposes, unquestionably the best medium for poster work.

The AMERICAN CRAYON COMPANY
NEW YORK DALLAS SAN FRANCISCO

HOME OFFICE AND FACTORIES — 1 HAYES AVENUE SANDUSKY OHIO

"Prang" Tempera colors are also excellent for decorating toys. A finishing coat of shellac should be applied.

BISON BRAND GLUE

100% Adhesiveness

A superior adhesive manufactured by the same process as Pure Food Gelatine, under ideal climatic conditions. This process, and the careful selection of raw material, yields a glue of 100% adhesive matter.

The most vital consideration in buying glue is its keeping properties. The BISON BRAND being 100% pure, its keeping properties are guaranteed.

The unusual adhesive strength and penetrating qualities make it an ideal glue for all requirements of the woodworking industry and school shops.

Uniformity is guaranteed.

Liberal working sample submitted upon request, in Sheet, Flake or Ground form.

HENRY WILHELM COMPANY, INC.

134-136 Tenth Street PITTSBURGH, PA.

NEW BOOKS

Display Composition
Job Composition

Seventeen pamphlets prepared and published by the Department of Education, the United Typothetae of America, Chicago.

These pamphlets carry forward the earlier standard apprenticeship lessons to include the advanced principles of composition. As in the case of the earlier lessons, they are characterized by clear statements of principles, by well considered shop practice, and by careful questions for review. Teachers now have available a finer group of teaching material from the pedagogical and trade standpoints than any other major trade in the United States.

MacQuarrie Test for Mechanical Ability

By T. W. MacQuarrie. Six booklets. Published by the Associated Students' Store, University of Southern California, Los Angeles, Calif.

A group performance test for determining mechanical ability of men.

Standard Apprenticeship Lessons for Printers

Three lessons on Display Composition. Issued by the Department of Education, United Typothetae of America, Chicago, Ill.

These latest additions to the standard apprenticeship lessons for printers take up the making and use of sketches and layouts. As in the case of the earlier sections, the lessons are complete and beautifully balanced to convey principles as well as correct practice. The Typothetae has led all other trades in genuinely educational courses for its apprentices.

Printing Job Sheets—Set No. 2

By C. W. Hague. Twenty-one sheets in envelope. Published by the author at Menomonie, Wisconsin.

Four process instruction sheets and seventeen job sheets are included in this advanced set. The work includes the setting of admission tickets, programs, posters, check forms, title pages, business cards, letterheads, envelope cards, statement forms, advertisements, tabular forms. The Harvey lesson plan is carried out in all the job sheets.

Embroidery and Pattern Design

By Hannah Fowler and George F. Craggs. Cloth, 158 pages, illustrated. Price, $2.25. Isaac Pitman & Sons, New York City.

While the course outlined in this interesting and carefully articulated book do not fit exactly into American school conditions, it contains much practical help for any teacher and many useful designs. The work is divided into four years for girls from 11 to 16 years of age. Design is taught as correlated work so developed that the principals may be directly applied to the work which is undertaken in each of the four years. The illustrations are complete.

PUBLICATIONS RECEIVED

Industrial Arts Program for the Princeton Public Schools, Princeton, N. J. Prepared by Harold Feuerstein, Supervisor of Industrial and Practical Arts, Princeton, N. J.

The Department of Industrial and Practical Arts at Princeton offers work in auto mechanics, concrete construction, electricity, mechanical drawing, photography, sheet metal working, and woodworking. The present bulletin provides general information concerning the time, and outlines the courses of study and the types of projects offered in that time. Mr. Feuerstein has 265 pupils in sixteen classes, ranging from grade 7 to 12. Six kinds of work are going on in the shop at the same time. In addition to the instructor, each class has the service of a pupil foreman. The work is the most inclusive instruction offered in a general shop that has come to the attention of the INDUSTRIAL ARTS MAGAZINE.

Manual Arts in the Junior High School. Paper, 301 pages. Published by the Board of Education, St. Cloud, Minn. This course of study outlines the manual arts offered in the seventh, eighth, and ninth grades of the St. Cloud schools. It includes mechanical and architectural drawing, exploratory woodwork, electricity, automotive, printing, machine shop and metal work courses, and advanced courses in each of these six branches of work. The correlation with other subjects of the school have been clearly defined.

Uses of the Marks of Punctuation. By C. L. Allen, Minneapolis, Minn. Printed by the Jefferson Junior High School Print Shop, Minneapolis, Minn. The study of printing offers the student a great opportunity to learn to punctuate. Most of the copy that comes to the print shop must be punctuated by the compositor, the proofreader, or copyreader. The principal marks of punctuation are the period, the colon, the semicolon, the comma, the interrogation point, the exclamation point, the dash, the parenthesis, the brackets, the quotation mark, the apostrophe and the hyphen. There is also a chapter on typographical restrictions in the division of words.

PERSONAL NEWS

Mr. H. C. Hutton has been employed as inspector of commercial work in the Texas schools.

Mr. J. M. Addison is the new instructor of vocational agriculture shop courses at Pleasanton, Tex.

Mr. E. O. Studhalter has been appointed to teach Smith-Hughes related subjects at San Antonio, Tex.

Mr. E. A. Funkhouser has been elected president of the Industrial Arts Section of the Texas Teachers' Association for the year 1926.

Mr. C. E. Rakestraw is the director of the El Paso Vocational School at El Paso, Tex. Other members of the faculty are: Miss Alice French, household service; Mr. C. A. Hall and Mr. Robert Koenig, auto mechanics; William Sachs, machine shop; Harry Blumenthal and H. E. Rodgers, printing; Mrs. Adah Mott and Mr. R. E. Seay, commercial; Miss Sophia Gilchrist and Mrs. Elba Payne, preparatory department, and Mrs. Jettie Stewart, power machine operation.

Mr. F. L. Bouda, a recent graduate of Stout Institute, has accepted a position as director of industrial arts at Minot, N. D.

Mr. Carl Gavic, a former student of Stout Institute, is teaching woodwork at Detroit, Mich.

Mr. John Maerzke, also a former student of Stout Institute, is now located at Springfield, Mass.

Mr. James Relihan, formerly of Stout Institute, is teaching manual training in the junior high school at Tampa, Fla.

Mr. Orley L. Duffin is teaching at Oskaloosa, Ia.

Mr. F. O. Krohn, formerly of Stout Institute, is teaching printing at Bisbee, Ariz.

Mr. Charles H. Krueger is teaching printing at Atlanta, Ga.

Mr. Leon K. Kuester is teaching woodwork and drawing at Wabasha, Minn.

Mr. Matt Lappinen is teaching printing at Saginaw, Mich.

Mr. John Ausman, a former student of Stout Institute is located at Wausau, Wis., where he is teaching auto mechanics

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21 Testing Watt-Hour Meters
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23 Induced Currents
24 Principles of Dynamos
25 Armature Construction
26 Winding D. C. Armatures
27 Field Magnets and Commutators
28 Types of D. C. Generators
29 Types of D. C. Motors
30 Types of A. C. Generators
31 Types of A. C. Motors
32 D. C. Motor Starters
33 Special Types of D. C. Controllers
34 A. C. Motor Starters
35 A. C. Motor Speed Regulators
36 Installing and Wiring D. C. Generators
37 Management of A. C. Motors
38 Inspecting and Testing Motors and Generators
39 Locating Motor and Generator Troubles
40 Repairing D. C. Motors and Generators
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19 Transmissions II (Troubles and Repairs)
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21 Rear Axles—Final Drive II (Adjustment—Repair)
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34 Gasoline Tractors II (Care and Operation)
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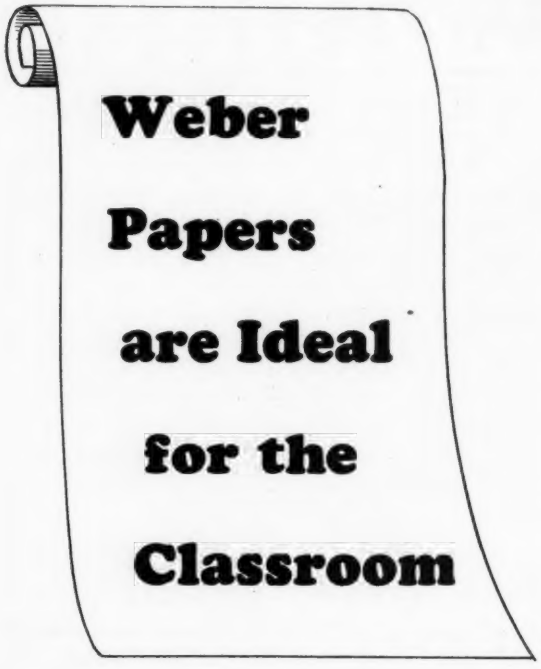

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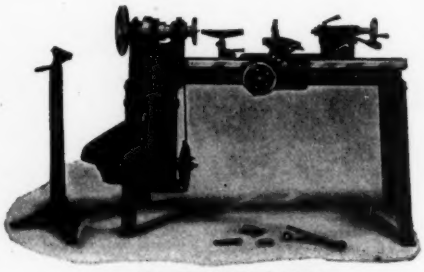

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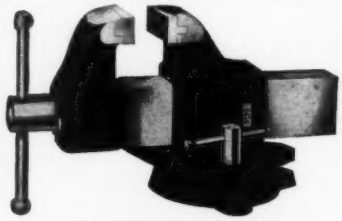

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NEWS AND NOTES

Outline Vocational Program for High School. The school authorities at Marshalltown, Ia., have begun work on the vocational program for the new high school, to include prospective courses in woodworking, drawing, home mechanics, electricity and radio, machine shop practice and forging, and sheet metal work. It is also planned to introduce part-time classes for apprentices along the line of cooperative industrial courses, with the addition of work in vocational agriculture and evening school classes.

Part-time Work in Shops. Twenty-five junior and senior students in the applied arts and industrial department of Wisconsin University have entered part-time work in Madison gift shops. Under the part-time cooperative plan, the work done outside the classroom is recognized equal to the classroom work. During the first semester, upper classmen become familiarized with the work so that they become able to take positions the second semester. Some of the students are paid at the beginning, while others serve apprenticeships before receiving a salary. No student receives compensation until he has proved himself an asset to the organization for which he works. Upon graduation, each student is expected to have completed a full year of experience in the work in which he is engaged.

Large Gain in Enrollment. The total enrollment in the Fond du Lac Vocational School, Fond du Lac, Wis., was 1,186 at the end of November, which is an increase of 248 over last year, when 938 students were enrolled. There are 300 men and 473 women in night schools, which is an increase of 218 over last year.

Will Meet in February. The Illinois Manual Arts Association will hold its annual convention at Peoria on February 12th and 13th. Information concerning the convention may be had from Mr. C. L. Jordan, Secy., Waukegan Township High School, Waukegan, Illinois.

Evening Vocational Work in Baltimore. Much of the work of the night schools in Baltimore, Md., is vocational in character. The work is of three types: Commercial, home economics, and industrial. In addition to this, some commercial work is offered in elementary school buildings. The courses in home economics include dressmaking, milinery, cookery, home nursing, and nutrition and health. In addition to the evening classes in home economics, a few classes are held in the afternoon.

Farm Mechanics Taught. Farm mechanics and other shop activities are being taught in the vocational agriculture department of the high school, Pleasanton, Tex.

Will Erect Junior High School. The board of education at San Antonio, Tex., has received bids for the erection of a new junior high school. The school which will be the largest of its kind in the school system, will be fully equipped with shops, and will cost over $250,000.

Cement Project Undertaken. The class in agricultural engineering in the Hopkinton high school, Hopkinton, N. H., has taken up cement work and has just completed a cement project which consisted of building a cement hotbed to replace the old wooden one. The cement and sand were mixed by hand, requiring two days, using a 1-4 mixture. The reinforcements consisted of old iron pipe furnished free of charge. After the forms were taken off they were made into covers for the winter, then two feet of dry leaves were packed in the bottom to prevent hard freezing.

Organize Agricultural Club. The Whitfield high school at Whitfield, N. H., has organized an agricultural club this year. It was started at a meeting given by the school committee to the parents of the community. At the first club meeting the domestic science girls gave the club a dinner, after which officers were elected and a constitution drawn up. The club is in full operation and has prospects for a successful future.

More Money for Trade School. The board of education of Wilmington, Del., has appropriated $1,000 to meet the present demands of the evening vocational school.

Build Sidewalk. The vocational class of the high school at Yoakum, Tex., has built several hundred yards of cement sidewalk about the high school campus. Material was furnished by the school board and the work was done by the class as a part of its study.

Organize Art Club. The art students of Westmoreland College, San Antonio, Tex., have recently organized an art club. The club is named after the late Julian Ondernoon one of the best known artists of Texas.

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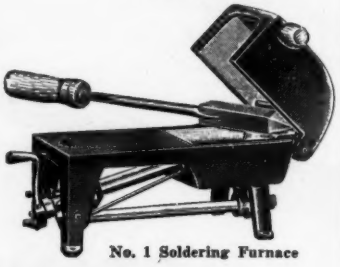

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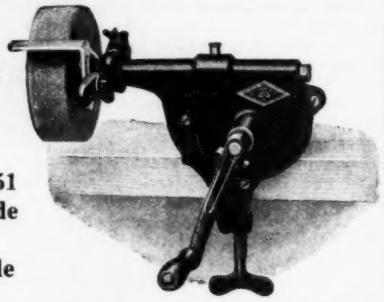

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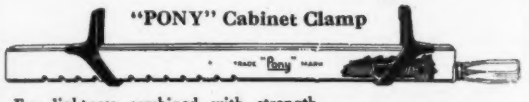

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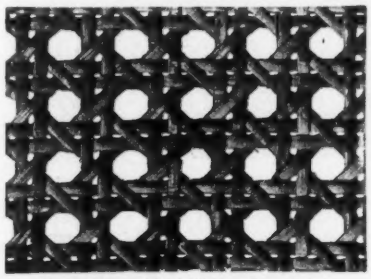

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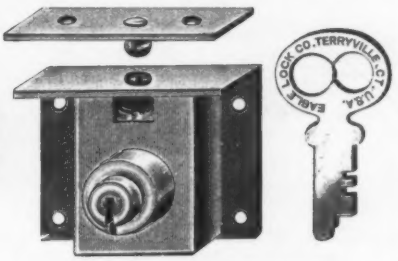

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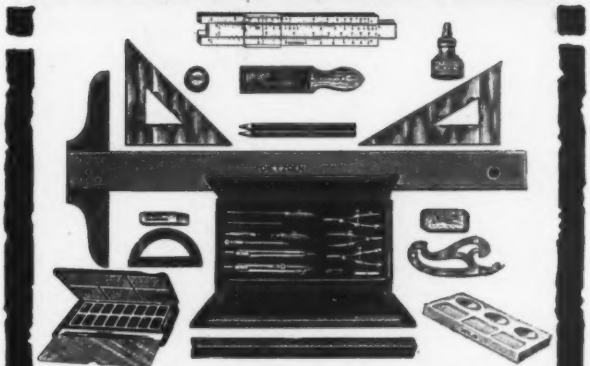

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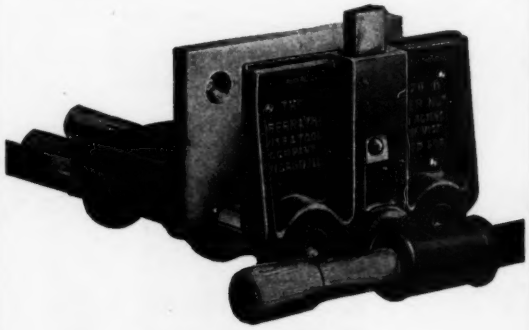

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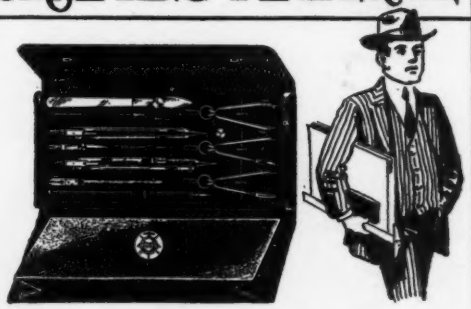

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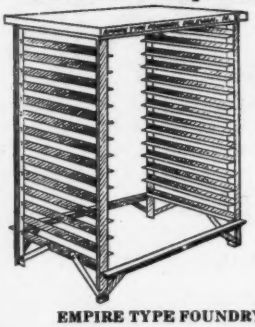

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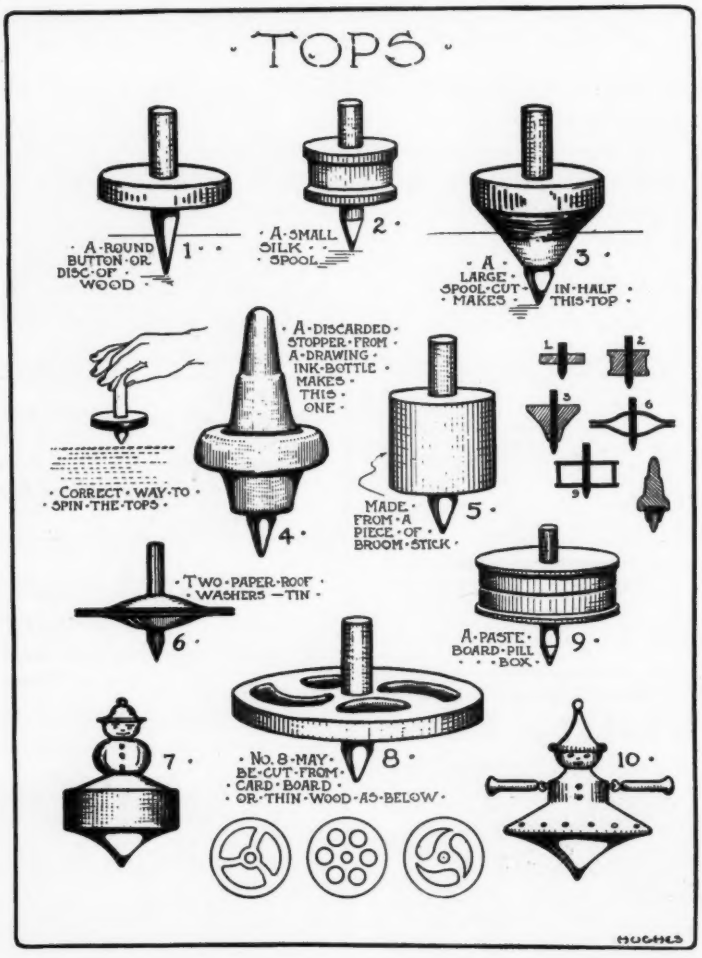

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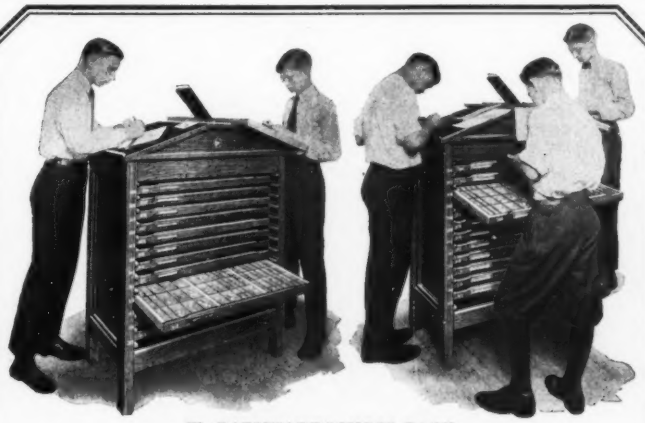

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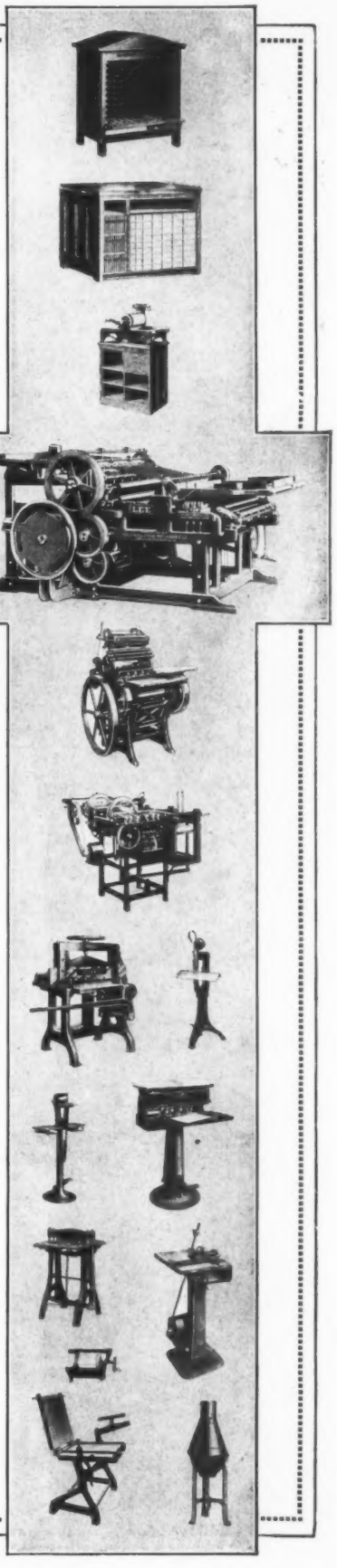

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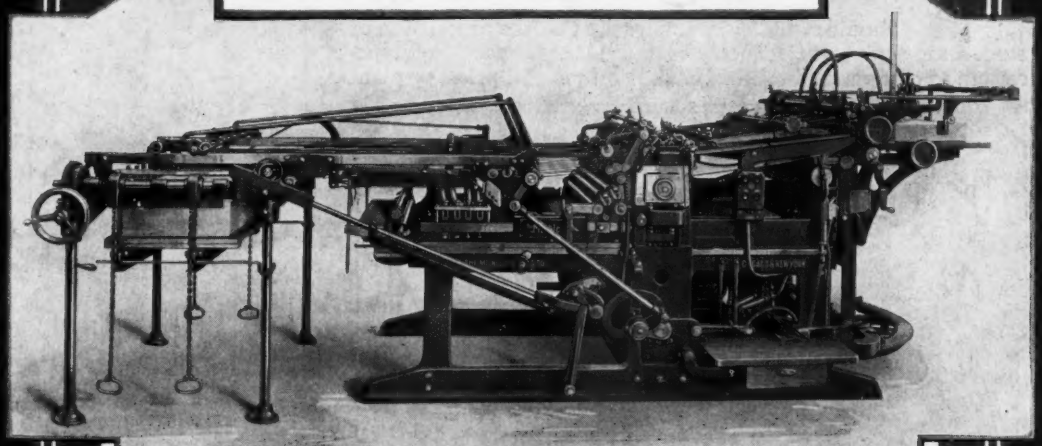

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